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environmental
impact
statement

BAYOU PLAQUEMINE BRULE WATERSHED

Acadia and St. Landry Parishes,
Louisiana

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
ALEXANDRIA, LOUISIANA

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BAYOU PLAQUEMINE BRULE WATERSHED
Acadia and St. Landry Parishes
Louisiana

FINAL ENVIRONMENTAL IMPACT STATEMENT

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CATALOGING - PREP.

Alton Mangum, State Conservationist
Soil Conservation Service

Sponsoring Local Organization

Acadia Soil and Water Conservation District
Post Office Box 637
Crowley, Louisiana 70526

St. Landry Soil and Water Conservation District
Post Office Box 472
Opelousas, Louisiana 70570

Acadia Parish Police Jury
919 North Avenue A
Crowley, Louisiana 70526

St. Landry Parish Police Jury
Post Office Box 511
Opelousas, Louisiana 70570

Sixth Ward and Crowley Drainage District
1206 North Avenue J
Crowley, Louisiana 70526

Iota-Long Point Gravity Drainage District
Post Office Box 5
Iota, Louisiana 70543

Egan Drainage District No. 1
Post Office Box 136
Egan, Louisiana 70531

Ward 1 Gravity Drainage District No. 2
405 Stadium Drive
Rayne, Louisiana 70578

Second Ward Gravity Drainage District No. 2
108 South Adams Street
Rayne, Louisiana 70578

SPONSORING LOCAL ORGANIZATION

Bayou Plaquemine Gravity Drainage District No. 12
Route 1, Box 120
Opelousas, Louisiana 70570

Second Ward Gravity Drainage District No. 1
108 South Adams Street
Rayne, Louisiana 70578

Bayou Plaquemine-Wikoff Gravity Drainage District
237 North Broadway Street
Church Point, Louisiana 70525

Fourth Ward Gravity Drainage District No. 1
Route 1, Box 187
Iota, Louisiana 70543

Bayou Plaquemine and Bayou Mallet Gravity Drainage District No. 10
Star Route, Box 7
Washington, Louisiana 70589

Fifth Ward Gravity Drainage District No. 1
Post Office Box 195
Midland, Louisiana 70557

April 1975

PREPARED BY
UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
Post Office Box 1630
Alexandria, Louisiana 71301

396610

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USDA ENVIRONMENTAL IMPACT STATEMENT

Bayou Plaquemine Brule Watershed Project

Acadia and St. Landry Parishes

Louisiana

Prepared in Accordance with

Sec. 102(2)(c) of P. L. 91-190

Summary Sheet

I. Final

II. Soil Conservation Service

III. Administrative

IV. Description of Project Purpose and Action: This project is for urban protection for the town of Church Point in Acadia Parish and for watershed protection, flood prevention, and drainage in Acadia and St. Landry Parishes, Louisiana. This will be implemented under the authority of the Watershed Protection and Flood Prevention Act (PL-566, 83d Congress, 68 Stat. 666), as amended. The plan includes clearing on 26 miles of channel and 203 miles of channel excavation in a flatland watershed that is 80 percent cropland and grassland. Of the 229 miles of channel work proposed, 218 miles will involve those with ephemeral flow, 5 miles with intermittent flow, and 6 miles with ponded water. Only 2 miles of the total work will be undertaken on unmodified natural channels. The majority of the work, 227 miles, is on channels which are manmade or previously modified.

V. Favorable Environmental Impacts and Adverse Environmental Effects:

Favorable -

Economic conditions will be improved.

Floodwater and drainage problems will be reduced, resulting in lower agricultural production costs, better quality of products and higher yields.

There will be an increase in average annual farm income.

The average annual agricultural floodwater damages will be reduced 71 percent.

A total of 111,600 acres of cropland and pastureland will directly benefit from the combined program of land treatment and structural measures.

An additional 74,900 acres of cropland and pastureland will benefit from accelerated land treatment and rotational systems.

An estimated 480 farmers will directly benefit from the installation of project measures and land treatment. An additional 40 farmers will benefit from accelerated land treatment only. These measures will provide benefits for 2,100 farm family members and farm employees.

The trend of decreasing number of farms and increasing size of farms will be slowed.

Erosion and the resulting sedimentation and turbidity will be decreased with installation of planned project measures.

Sediment, as a result of sheet erosion, will be reduced from 1,140,000 tons per year to 1,033,655 tons per year.

Sediment delivered to the Mermentau River as a result of sheet erosion will be reduced by 13 percent (250,800 tons/year to 218,531 tons/year).

Sheet erosion will be reduced about 8 percent or 94,208 tons/year.

Agricultural chemicals delivered downstream will be reduced due to reduction in sheet erosion as a result of land treatment measures.

Under present conditions, a storm of 1 percent chance occurrence (100-year frequency) will produce a peak stage on Bayou Plaquemine Brule at Louisiana Highway 95 in Church Point of approximately 45.8 feet mean sea level (m.s.l.). With project measures installed, the 100-year peak stage will be about 43.6 feet m.s.l. or 2.2 feet lower.

The town of Church Point will be provided protection from flooding from the 100-year storm. This will reduce significant damages to 40 residences, 11 commercial properties, and an industrial complex. Nuisance damages to residences and to the public will be reduced. Urban damages, exclusive of road and bridge damages, will be reduced 84 percent.

Flood damages to roads and bridges will be reduced.

Access to project channels will be improved.

Installation of seven structures for water control (weirs) will create 33 acres of permanent water.

The creation of 33 acres of permanent water will result in additional water for agricultural uses, fish and wildlife habitat, and reduce channel maintenance.

Temporary increases of mourning doves, bobwhite quail, and some nongame species will result from the conversion of 109 acres of forest and wooded channel banks to spoil and berms along channels.

Installation of the project will create about 185 man-years of local labor over the installation period; operation and maintenance will create 200 man-years of local labor over the project life.

Adverse -

Construction will cause approximately 13,000 tons of sediment to be delivered to Bayou des Cannes during the 6-year project construction period.

Temporary increases in turbidity and suspended solids downstream will result from construction.

Occasional periods of noxious aquatic weed growth may occur in the permanent water created by the seven structures for water control (weirs).

About 654 acres of open land, 96 acres of wooded channel banks, and 90 acres of forest land not presently occupied by channels, berms, and spoil will be disturbed during construction. In addition to this, 1,088 presently occupied will be disturbed. This will result in some reductions of both game and nongame animals.

Temporary reductions in the biological productivity of the aquatic ecosystems will occur because of channel enlargements, clearings, and temporary lowering of water quality.

Project rights-of-way will require additional open land resulting in a net loss of about $50,000 in agricultural production.

Peak stages will be increased up to 0.3 feet in Bayou Plaquemine Brule downstream from modified channel reaches.

The aesthetic resources will be changed along 19 miles of channels passing through forest land and along 34 miles of channels in open land where woody vegetation grows along its banks.

Existing potholes, in-channel cover, and cover on one bank will be removed. This will cause a degradation of habitat for alligator (if present), waterfowl, and other aquatic wildlife resources.

There will be a slight increase in water temperatures where large trees and other bank vegetation are removed. This will be most prevalent in ponded water areas.

There will be a loss of 90 acres of potential habitat for "endangered" wildlife species through the conversion of forest land to channels, berms, and spoil.

Vegetation (hardwoods) on about 40 acres of Type I wetlands will be cleared for rights-of-way and flooding along the fringes of about 560 acres of Type I wetlands will be reduced as a result of channel work.

VI. <u>List of Alternatives Considered</u>:

A. Land Treatment Only
B. Using Land for Purposes More Tolerant to Poor Drainage Conditions
C. Floodproofing and Land Treatment
D. Channel Work Required to Provide the 1.5-, 3-, and 5-year Levels of Protection and Land Treatment
E. Floodwater Retarding Structures and Channel Work
F. No Project Action

VII. Comments were received from the following agencies:

Department of Commerce
Department of Health, Education, and Welfare
Department of Transportation
Environmental Protection Agency
Advisory Council on Historic Preservation
Commandant, U.S. Coast Guard
Louisiana Forestry Commission
Department of the Interior
Department of the Army
Louisiana Geological Survey
Louisiana Department of Art, Historical, and Cultural Preservation
Louisiana Health and Human Resources Administration Division of Health

VIII. Draft Statement Transmitted to CEQ on December 23, 1974.

USDA SOIL CONSERVATION SERVICE

FINAL ENVIRONMENTAL IMPACT STATEMENT

for

Bayou Plaquemine Brule Watershed

Acadia and St. Landry Parishes, Louisiana

Installation of this project constitutes an administrative action. Federal assistance will be provided under authority of Public Law 83-566, 83d Congress, 68 Stat. 666, as amended.

SPONSORING LOCAL ORGANIZATION

Acadia Soil and Water Conservation District
St. Landry Soil and Water Conservation District
Acadia Parish Police Jury
St. Landry Parish Police Jury
Sixth Ward and Crowley Drainage District
Iota-Long Point Gravity Drainage District
Egan Drainage District No. 1
Ward 1 Gravity Drainage District No. 2
Second Ward Gravity Drainage District No. 2
Bayou Plaquemine Gravity Drainage District No. 12
Second Ward Gravity Drainage District No. 1
Bayou Plaquemine-Wikoff Gravity Drainage District
Fourth Ward Gravity Drainage District No. 1
Bayou Plaquemine and Bayou Mallet Gravity Drainage District No. 10
Fifth Ward Gravity Drainage District No. 1

PROJECT OBJECTIVES AND PURPOSES

The project objectives are:

1. Provide improved farming conditions to increase farm family incomes and improve living conditions.

2. Reduce average soil loss to the minimum consistent with sound conservation farming methods.

3. Provide agricultural land a substantial increase in level of protection from flooding and wetness problems in order to increase economic returns.

4. Facilitate achieving the preceding objectives by providing acceleration of the going land treatment program so that about 75 percent of the agricultural land will be adequately treated by the end of the project installation period.

5. Install project measures in a manner which will be least damaging to wildlife habitat. Measures will be installed to minimize losses to fish and wildlife where applicable.

6. Provide protection in the town of Church Point from significant damages in the 100-year frequency storm.

The purposes of the project are watershed protection, flood prevention, and drainage.

PLANNED PROJECT

Land Treatment

Land treatment measures will be installed in accordance with soil and water conservation plans developed by the land users in cooperation with the Acadia and St. Landry Soil and Water Conservation Districts. These plans are based on the proper use of soils within their capabilities and the scope of their anticipated use. To establish capabilities and limitations, soils are analyzed and classified by the use of soil surveys.

Soil scientists with the Soil Conservation Service prepare soil maps based on systematic borings. Soils are classified according to texture, structure, color, thickness of each distinct layer, and steepness of slope. The amount of erosion which has taken place and the rate water will move through the soil are estimated. The pH of the soil is determined. The land capability class for each soil is determined. From these capability classes, the conservation measures which will adequately treat the land are determined. Detailed soil surveys will be made on 34,400 acres of land.

A complete land treatment program will be installed on 124,000 acres of cropland, pastureland, and other land during the installation period. The remainder of the cropland and pastureland will have some land treatment measures installed. The major soil and water conservation measures to be installed and their functions are as follows:

Land Treatment Measures	Function
Conservation Cropping System	Growing crops in a sequence that will help control weeds, maintain soil fertility and protect the soil from erosion. Cropping system sequences vary according to needs of each field for protective soil cover. Cover and green manure are included as needed for soil protection and improvement.
Crop Residue Management	Leaving crop residues on the soil surface of cultivated fields to provide soil cover during periods when erosion is critical. Crop residues are used as a mulch to intercept the impact of falling raindrops, thereby keeping soil detachment and nutrient loss at a

Land Treatment Measures	Function
Crop Residue Management cont.	minimum. The tilth of the soil is improved and the water intake of the soil is increased.
Drainage Mains and Laterals	Constructing open drainage ditches designed to remove excess surface and subsurface water in order to improve the plant growing environment.
Pasture and Hayland Management	Using fertilization, weed control, and grazing practices that maintain a good, thick cover of plants on the soil surface to reduce erosion and produce high forage and livestock yields.
Pasture and Hayland Planting	Planting grasses and legumes that will produce large quantities of high quality forage and control erosion. After plants are established, pasture and hayland management practices are used to maintain good cover.
Irrigation Pipeline	Installing underground pipelines and appurtenances in irrigation systems. This allows proper management of irrigation water and prevents erosion and water loss.
Structures for Water Control (pipe drops)	Using structures where the force of flowing water is sufficient to cause erosion. These structures provide a means of lowering the water from a higher elevation to a lower one in a short distance without causing erosion damage.
Land Smoothing	Removing irregularities on the land surface to provide a more uniform surface for irrigation water application, to improve surface drainage, to obtain more uniformity in planting and cultivating, and to improve equipment operation efficiency.

PLANNED PROJECT

Land Treatment Measures	Function
Irrigation Land Levelling (water levelling irrigated riceland)	Reshaping land surfaces to uniform, level grade in order to improve irrigation efficiency and increase yields.
Wildlife Wetland Habitat	Managing, retaining, or creating wildlife wetland habitat to provide food and cover for wildlife and to maintain soil cover.
Wildlife Upland Habitat Management	Managing, retaining, or creating wildlife upland habitat to provide food and cover for wildlife and to maintain soil cover.

Land used within its capabilities and on which the proper conservation practices have been applied to compensate for its limitations is considered to be adequately treated. Providing necessary drainage and maintaining proper ground cover are the major land treatment problems in the watershed. Proper drainage allows healthy plant growth and good cover minimizes sheet erosion. On-farm mains and laterals, combined with adequate outlets, will provide drainage and flood protection needed for profitable and efficient production of crops.

Of the 124,000 acres to be treated adequately during the installation period, 114,300 acres are cropland, 4,900 acres are pastureland, and 4,800 acres are other land. In addition, conservation plans will have been prepared and some land treatment (not enough for the land to be adequately treated) begun on 16,200 acres of cropland and 3,300 acres of pastureland.

Conservation measures to be planned and applied on cropland include conservation cropping systems, crop residue management, land smoothing, and structures for water control. Control of headcutting and channel bank erosion where concentrations of water enter deeper channels will be accomplished through the installation of structures for water control (pipe drops); see appendix G. All such structures that control erosion on ditches entering nonproject channels will be a land treatment measure. Structures that control erosion on ditches with less than 20 acres drainage area entering project channels will also be land treatment measures. Other structures that control erosion of areas entering project channels will be project structural measures. The installation of these conservation measures on cropland will enhance the use of high-residue-producing and soil-conditioning crops, provide controlled disposal of excess surface water and reduce erosion.

Conservation measures to be planned and applied on pasture include pasture and hayland management, pasture and hayland planting, and drainage mains and laterals. These measures will contribute materially to the establishment of a sound livestock grazing program. They will

facilitate a more uniform distribution of grazing and permit management which will provide more effective ground cover for runoff and erosion control.

Approximately 4,800 acres of multiple-use wildlife habitat on cropland and other land will be created, maintained, or improved during the installation of land treatment measures by establishing plants that provide wildlife food and cover. Diking and installing structures for water control on wetlands will be used to improve wildlife habitat. Technical assistance through the soil and water conservation district program will be made available for land users to encourage and assist them in proper development of other conservation measures that will improve wildlife habitat and harvest.

Although an accelerated forestry program is not proposed for this watershed, technical assistance to forest landowners is available from the Louisiana Forestry Commission under the going Cooperative Forest Management Program. Landowners will be encouraged to apply multiple-use management to their forest lands.

The amount and estimated costs of conservation treatment measures to be applied are shown in table 1. These measures will be installed during the 10-year installation period. Installation and maintenance of such measures will continue after the installation period.

Accelerating the present rate of technical assistance during the 10-year installation period is expected to accomplish the following results:

1. Land users who are now or will become soil and water conservation district cooperators will develop 297 soil and water conservation plans.

2. Land users who will become soil and water conservation district cooperators will sign 281 new soil and water conservation agreements.

3. Land users will revise 205 conservation plans now in use.

4. Soil surveys will be made on the remaining 34,400 acres needing surveys.

5. Complete conservation treatment to adequately treat 124,000 acres of land will be installed and some conservation treatment begun on 19,500 acres of cropland and pastureland.

Structural Measures

Measures in this plan are comprehensive in nature, with full consideration given to the multiple-use concept of resource planning.

The primary benefits that will accrue as a result of project installation will be from flood reduction and drainage. Minimizing damages to fish and wildlife while achieving these objectives is an important concern.

Structural measures consist of channel work which includes (1) excavation, (2) clearing, (3) structures for water control (weirs), (4) structures for water control (pipe drops), and (5) grade stabilization structures. Structures for water control (pipe drops and weirs) and grade stabilization structures are appurtenant to the channel. The structures for water control (weirs) also minimize damages to the fish and wildlife habitat caused by construction.

Approximately 250 miles of project channels are necessary to achieve project objectives in reducing flood damages and inadequate drainage. These channels will be referred to herein as "project channels" within the benefit areas as shown on the Project Map, Appendix C. Investigations indicate 21 miles are adequate and will not require work, 26 miles will be cleared leaving the ground cover and root armor, and 203 miles will be enlarged.

The published soil survey of Acadia Parish was used to locate areas of possible channel stability problems. The stability of present channels was also observed.

Investigations and anaylses revealed that the soils were either clays (CH) or silty clays (CL) except in one area. In this area near Mowata Church, a ML or CL was encountered at depths of 2 to 4 feet. Channels in this area were designed for velocities less than 3 feet per second. Past experience indicates that this velocity will not erode the material.

Classification of the type of channel and flow characteristics of the project channels is as follows:

Type of Channel	Length Project Channels	Length Requiring Work
	miles	
Manmade or previously modified	248	227
Natural or previously unmodified	2	2
Nonexisting or no-defined channel	0	0
Total	250	229
Flow Characteristics		
Ephemeral	237	218
Intermittent	7	5
Ponded Water	6	6
Total	250	229

The length and area to be occupied by project channels rights-of-way are shown on the tabulations on pages 13 and 14.

LENGTH AND AREA OCCUPIED BY PROJECT CHANNELS RIGHTS-OF-WAY

Channel Number	Excavation Length[a]	Excavation Right-of-Way Existing	Excavation Right-of-Way Planned	Clear Only Length[a]	Clear Only Right-of-Way Existing	Clear Only Right-of-Way Planned	Adequate Length[a]	Adequate Right-of-Way Existing	Adequate Right-of-Way Planned
	miles	acres	acres	miles	acres	acres	miles	acres	acres
M-1	2.76	58.53	79.91	-	-	-	-	-	-
L-1A	-	-	-	1.99	7.65	11.48	-	-	-
L-1A-1	2.58	7.20	15.05	-	-	-	-	-	-
L-1A-1A	0.52	1.43	3.01	-	-	-	-	-	-
L-1B	9.11	71.10	105.25	0.28	2.58	3.00	-	-	-
L-1C	1.18	3.25	6.94	-	-	-	-	-	-
L-1D	4.02	11.06	23.39	-	-	-	1.10	3.02	8.31
L-1D-1	1.30	3.57	7.63	-	-	-	-	-	-
L-1D-3	1.98	5.44	11.57	-	-	-	-	-	-
L-1D-4	1.01	2.78	5.95	-	-	-	-	-	-
L-1E-1	1.16	3.19	6.82	-	-	-	-	-	-
L-1E-2	0.67	1.84	3.88	-	-	-	-	-	-
L-1E-3	1.13	3.11	6.65	-	-	-	-	-	-
L-1E-4	0.46	2.48	3.03	-	-	-	-	-	-
L-1E-4A	1.98	5.44	11.67	-	-	-	-	-	-
L-1E-4B	2.13	5.96	12.44	-	-	-	-	-	-
L-1E-4B-1	1.83	5.03	10.70	-	-	-	-	-	-
L-1E-5	0.50	1.39	2.90	-	-	-	-	-	-
L-1E-6	0.20	1.38	1.72	0.76	5.97	7.35			
L-1F	2.68	7.37	15.62	-	-	-	1.88	2.96	5.70
L-1F-1	1.15	3.16	6.76	-	-	-	-	-	-
L-1F-1A	0.31	0.85	1.80	-	-	-	-	-	-
L-1F-2	0.52	1.43	3.01	-	-	-	-	-	-
L-1G	2.87	7.89	16.73	-	-	-	-	-	-
L-1H	3.78	10.40	22.00	-	-	-	-	-	-
L-1H-1	0.90	2.48	5.21	-	-	-	-	-	-
L-1I-1	2.46	6.77	14.35	-	-	-	-	-	-
L-1I-2	1.22	3.36	7.16	-	-	-	-	-	-
L-1I-3	1.34	3.69	7.86	-	-	-	-	-	-
L-1I-4	1.45	3.99	8.50	-	-	-	-	-	-
L-1I-5	3.48	23.35	31.30	0.76	5.05	6.43	-	-	-
L-1I-6	5.38	19.59	56.22	-	-	-	-	-	-
L-1I-7	3.17	20.08	28.16	3.19	21.98	27.79	-	-	-
L-1I-7A	0.58	3.11	4.49	-	-	-	-	-	-
L-1I-8	2.20	8.45	16.87	-	-	-	-	-	-
L-1I-8A	0.46	2.35	3.45	-	-	-	-	-	-
L-1I-8A-1	0.95	4.56	6.94	-	-	-	-	-	-
L-1I-9	1.26	8.56	12.52	-	-	-	-	-	-
L-1I-9A	0.90	3.45	7.43	0.34	2.21	3.11	-	-	-
L-1I-9A-1	0.39	1.39	2.70	-	-	-	-	-	-
L-1I-10	0.57	2.78	4.12	0.66	3.13	5.55	1.52	6.62	12.12
L-1I-10A	0.29	1.02	2.14	-	-	-	-	-	-
L-1I-10B	0.44	1.03	2.84	-	-	-	1.02	2.48	6.83
L-1I-10B-1	0.55	2.30	3.73	-	-	-	0.38	1.61	2.53
L-1I-11	0.29	0.51	1.80	-	-	-	-	-	-
L-1I-12	-	-	-	0.66	1.19	4.37	-	-	-
L-1J	1.65	4.54	9.66	-	-	-	-	-	-
L-1J-1	0.64	1.76	3.71	-	-	-	-	-	-
L-1K	7.32	35.44	65.58	3.10	14.29	26.71	-	-	-
L-1K-1	2.01	5.53	17.75	-	-	-	-	-	-
L-1K-1A	0.84	2.31	4.87	-	-	-	-	-	-
L-1K-2	0.81	2.23	4.69	-	-	-	-	-	-
L-1K-3	0.64	1.77	3.71	-	-	-	-	-	-
L-1K-4	5.03	26.34	47.34	3.50	24.64	32.28	-	-	-
L-1K-4A	0.75	2.06	4.35	-	-	-	-	-	-
L-1K-4B	1.51	6.18	10.96	-	-	-	1.52	8.71	12.93
L-1K-4B-1	0.58	1.60	3.36	-	-	-	-	-	-
L-1K-4B-2	1.01	2.78	5.85	-	-	-	-	-	-
L-1K-4B-3	0.86	1.54	6.15	-	-	-	-	-	-
L-1K-4C	0.94	2.59	5.45	-	-	-	-	-	-
L-1K-4D	0.73	1.30	4.16	-	-	-	-	-	-
L-1K-4E	0.38	1.34	2.32	-	-	-	0.66	3.22	4.83
L-1K-5	1.30	7.19	10.33	1.80	11.47	14.65	1.42	10.32	12.04
L-1K-5A	1.76	4.84	10.30	-	-	-	-	-	-
L-1K-5B	0.94	2.58	5.45	-	-	-	-	-	-
L-1K-5B-1	0.45	1.24	2.61	-	-	-	-	-	-
L-1K-6	1.49	4.10	8.73	-	-	-	-	-	-
L-1K-7	1.65	4.54	9.66	-	-	-	-	-	-
L-1L	4.21	19.23	36.03	0.76	3.49	6.62	1.97	8.59	18.15
L-1L-1	3.55	15.24	29.73	2.08	11.53	18.73	1.60	9.62	13.89
L-1L-2	7.32	41.39	66.09	0.19	1.24	1.70	-	-	-
L-1L-2A	0.60	1.65	3.48	-	-	-	-	-	-
L-1L-2B	0.56	1.54	3.24	-	-	-	-	-	-
L-1L-2C	0.69	1.90	4.00	-	-	-	-	-	-
L-1L-2D	0.99	2.72	5.74	-	-	-	-	-	-
L-1L-2E	1.17	3.22	6.88	-	-	-	-	-	-
L-1M	0.84	2.31	4.87	-	-	-	-	-	-
L-1N	1.74	4.79	10.18	-	-	-	-	-	-
L-10	1.39	3.82	8.15	-	-	-	-	-	-
L-1P	0.26	0.72	1.51	-	-	-	-	-	-
L-1P-1	0.20	0.55	1.16	-	-	-	-	-	-

a/ See Appendix K for Inventory of Channel Work by Reaches.

-continued-

LENGTH AND AREA OCCUPIED BY PROJECT CHANNELS RIGHTS-OF-WAY (continued)

Channel Number	Excavation			Clear Only			Adequate Right-of-Way		
	Length[a]	Existing	Planned	Length[a]	Existing	Planned	Length[a]	Existing	Planned
	miles	acres		miles	acres		miles	acres	
L-1R	10.66	67.32	107.99	-	-	-	-	-	-
L-1R-1	1.96	9.41	15.41				0.28	1.00	2.38
L-1R-2	0.83	3.99	5.88	0.66	2.88	4.27	1.33	9.62	12.04
L-1R-3	2.75	11.22	21.88	-	-	-	-	-	-
L-1R-4	0.50	0.65	2.05	-	-	-	-	-	-
L-1R-5	1.24	6.14	9.07	-	-	-	-	-	-
L-1S	0.40	1.42	4.84	-	-	-	-	-	-
L-1U	0.70	1.42	3.33	-	-	-	-	-	-
L-1V	0.53	1.39	3.78	-	-	-	-	-	-
L-1W	0.67	3.78	7.17	1.68	13.29	17.11	2.27	14.01	19.51
L-1W-1	0.77	1.45	5.52	0.98	3.90	6.74	1.38	5.57	9.52
L-1W-1B	1.46	3.56	7.24	-	-	-	-	-	-
L-1W-2	0.42	1.20	3.49	2.65	18.32	25.71	-	-	-
L-1W-2A	2.33	9.22	19.94	0.19	1.15	1.72	-	-	-
L-1W-2A-1	0.29	0.82	2.07	-	-	-	-	-	-
L-1W-2B	1.01	2.29	7.11	-	-	-	-	-	-
L-1W-5	0.64	1.57	5.02	-	-	-	0.25	0.80	2.02
L-1W-5A	0.26	0.31	1.62	-	-	-	-	-	-
L-1Y	1.21	5.36	10.10	-	-	-	-	-	-
L-1Y-1	2.01	6.27	16.49	-	-	-	-	-	-
L-1Z	1.80	4.95	10.53	-	-	-	-	-	-
L-1Z-1	0.60	1.65	3.48	-	-	-	-	-	-
L-1Z-2	0.64	1.76	3.71	-	-	-	-	-	-
L-1Z-3	0.49	1.35	2.84	-	-	-	-	-	-
L-1Z-5	0.35	0.96	2.03	-	-	-	-	-	-
L-1Z-6	0.35	0.96	2.03	-	-	-	-	-	-
L-1AA	-	-	-	-	-	-	2.45	19.57	27.88
L-1AA-1	0.50	1.38	2.90	-	-	-	-	-	-
L-1AA-2	0.41	1.13	2.38	-	-	-	-	-	-
L-1AA-3	0.52	1.43	3.01	-	-	-	-	-	-
L-1AA-4	0.18	0.50	1.04	-	-	-	-	-	-
L-1AA-5	0.75	2.06	4.34	-	-	-	-	-	-
L-1AA-5A	0.35	0.96	2.03	-	-	-	-	-	-
L-1AA-6	0.50	1.38	2.90	-	-	-	-	-	-
L-1AA-7	0.90	2.47	5.21	-	-	-	-	-	-
L-1AA-8	0.73	2.01	4.22	-	-	-	-	-	-
L-1BB-1	4.61	12.68	26.87	-	-	-	-	-	-
L-1BB-1A	0.60	1.65	3.48	-	-	-	-	-	-
L-1BB-1A-1	0.31	0.85	1.80	-	-	-	-	-	-
L-1CC	0.56	1.54	3.24	-	-	-	-	-	-
L-1DD	1.74	4.89	10.18	-	-	-	-	-	-
L-1DD-1	0.82	2.26	4.75	-	-	-	-	-	-
L-1EE	0.52	1.43	3.01	-	-	-	-	-	-
L-1FF	1.18	3.24	6.94	-	-	-	-	-	-
L-1FF-1	0.48	1.32	2.78	-	-	-	-	-	-
L-1FF-2	0.22	0.61	1.27	-	-	-	-	-	-
L-1FF-3	0.16	0.44	0.93	-	-	-	-	-	-
L-1GG	0.47	1.29	2.72	-	-	-	-	-	-
L-1HH	3.69	10.25	20.96	-	-	-	-	-	-
L-1HH-1	0.77	2.13	4.49	-	-	-	-	-	-
L-1HH-2	0.35	0.96	2.03	-	-	-	-	-	-
L-1II	1.47	4.04	8.62	-	-	-	-	-	-
L-1II-1	0.64	1.76	3.71	-	-	-	-	-	-
L-1JJ	1.65	4.54	9.66	-	-	-	-	-	-
L-1JJ-1	0.47	1.29	2.72	-	-	-	-	-	-
L-1KK	0.75	2.06	4.35	-	-	-	-	-	-
L-1KK-1	0.26	0.72	1.51	-	-	-	-	-	-
L-1KK-2	0.29	0.80	1.68	-	-	-	-	-	-
L-1LL	0.39	1.07	2.26	-	-	-	-	-	-
L-1MM	0.37	1.02	2.14	-	-	-	-	-	-
L-1NN	0.39	0.92	2.76	-	-	-	-	-	-
L-1OO	2.68	7.47	15.63	-	-	-	-	-	-
L-1OO-1	0.48	1.32	2.78	-	-	-	-	-	-
L-1OO-2	0.35	0.96	2.03	-	-	-	-	-	-
L-1PP	2.23	6.13	13.02	-	-	-	-	-	-
L-1QQ	0.88	2.42	5.10	-	-	-	-	-	-
L-1RR	0.37	1.02	2.14	-	-	-	-	-	-
L-1TT	1.99	5.47	11.63	-	-	-	-	-	-
Total	202.77	827.77	1,540.11	26.23	155.96	225.32	21.03	104.70	162.37

a/ See Appendix K for Inventory of Channel Work by Reaches.

These flow conditions will remain the same after the project is installed except for changes due to the increase in ponded water created by the installation of structures for water control (weirs). The ponded water will be created in 11 miles of previously ephemeral flow and 1 mile of intermittent flow. The types of channel and flow are defined in the coding system on page 16.

Land easements and rights-of-way will be acquired by using Louisiana revised statute 38:113, signing of flowage easements, and when necessary, by fee simple title. Appraisals necessary for purchasing easements will be acquired through reputable land and property appraising institutions. Construction permits are required by the U.S. Army Corps of Engineers (Engineering Regulation No. 1165-2-302) for channel work to be done on Bayou Plaquemine Brule and on channels tributary to the Bayou. These permits will be obtained by the Sponsoring Local Organization prior to the installation of any structural measures.

Seven structures for water control (weirs), appendix G., will be installed at strategic points in channels to minimize damages to fish and wildlife habitat, reduce downstream sediment following construction, reduce growth of vegetation on the channel bottom during dry season, provide additional water supplies necessary to maintain agricultural production, and maintain aesthetics of the landscape. These structures will be installed prior to any work being performed upstream from them and will impound approximately 12 miles (33 surface areas) of additional permanent water. Allowances for sediment were made in the design of these structures. Therefore, the designed depth of the permanent water created by these structures will not be affected by accumulations of sediment. For discussion of the impacts of these structures on fish and wildlife resources, refer to page 20 of Planned Project, and pages 95 and 96 of the Environmental Impact. These structures are considered appurtenant measures to channel work.

Spoil from the channels will be stacked and smoothed in the forest areas and stacked or spread, as appropriate, in open areas. Short recesses for sediment interception will be installed where needed at the junctions of principal laterals with the main channels.

As the channel work is being performed, berms will be maintained and spoil will be placed in a manner to allow maintenance equipment access to the channel. Channel crossings will be constructed where necessary for continuity of access. Some crossings will be provided by special construction of structures for water control (pipe drops). Appendix G, Figure 1, shows vegetative limits - channel profile and cross sections. Photographs of structures for water control are shown on page 17.

Flood prevention for the town of Church Point is a project purpose. About 3 miles of Channel M-1 with intermittent flow in this vicinity

PLANNED PROJECT

Soil Conservation Service

Coding System for
Inventory of Channel Work

Type of Work

- I - establishment of new channel including necessary stabilization measures
- II - enlargement or realignment of existing channel or stream
- III - cleaning out natural or manmade channel (includes bar removal and major clearing and snagging operation)
- IV - clearing and removal of loose debris within channel section
- V - stabilization, by continuous treatment or treatment of localized problem areas, as primary purpose (present capacity adequate)
- VI - adequate

Type of Channel Prior to Project

- N - an unmodified, well-defined natural channel or stream
- M - manmade ditch or previously modified channel
- O - none or practically no defined channel

Flow Condition Prior to Project

- Pr - perennial - flows at all times except during extreme drought
- I - intermittent - continuous flow through some seasons of the year but little or no flow through other seasons
- E - ephemeral - flows only during periods of surface runoff
- S - ponded water with no noticeable flow, caused by lack of outlet or high ground water level.

A Structure for Water Control (Weir)
Similar to the Ones Planned on Larger Channels

A Structure for Water Control (Pipe Drop)
Similar to the Ones Planned on Small Side Drains

are designed to provide a 100-year level of protection from flooding (significant damages to residences and businesses will not be caused by floodwater from the 100-year storm). The other 2 miles of intermittent channels that require work are portions of Gum Point Gully and Deep Gully.

Grade stabilization structures shown in appendix G, figure 4, are considered integral parts of the channel work. Preliminary studies indicate 28 grade stabilization structures are needed. Twenty-seven are to be installed in lateral channels that drain in the portion of Channel M-1 that is to receive work. These structures will prevent lateral channel erosion and will protect Channel M-1 from excessive sedimentation, thereby reducing downstream turbidities and maintenance. One is to be installed in Channel L-II-8A. The exact locations and sizes of these structures will be determined during the operations stage when additional survey data and foundation investigations are obtained.

Appendix G, figure 3, shows a typical structure for water control (pipe drop). Structures of this type or similar appurtenant measures will be installed to prevent erosion and thus protect the channel from excessive sedimentation, reduce maintenance cost, and insure proper functioning of the channels. These structures are similar to grade stabilization structures except they are on a smaller scale, less complex, and are located on the smaller laterals entering project channels.

Construction on channels tributary to Bayou Plaquemine Brule and Bayou Wikoff will be terminated at a distance ranging from 200 feet to 1,000 feet before entering these bayous in order to lessen the adverse effects to fisheries. These undisturbed areas will filter some sediment from these bayous and are shown as channels to be worked on the project map. For further discussion of this subject, see Item 4, page 21.

Approximately 1,928 acres of rights-of-way will be disturbed because of channel work. Approximately 1,088 acres are occupied by existing channels, berms, and spoil. Therefore, approximately 840 acres of additional rights-of-way will be needed to install the project measures of this watershed. This 840-acre increase is comprised of 654 acres of open land, 96 acres of wooded channel banks, and 90 acres of forest. Several alternatives for establishing vegetative cover on the disturbed areas were evaluated by the Louisiana Wild Life and Fisheries Commission, U.S. Fish and Wildlife Service, and Soil Conservation Service. Due consideration was given to providing the most expedient method of reestablishing vegetation to prevent erosion and to provide food and cover for wildlife. The most practical approach would be to establish a ground cover and plant hardwood seedlings on the 34 acres of spoil in the forest land.

Vegetation will be established on rights-of-way and disturbed areas along project channels after heavy or plant-destroying equipment

has ceased traveling on the berm. Depending on the season of the year, the crops being grown, and desires of the farmer, spreading of the spoil may or may not be accomplished soon after construction; it will be shaped and seeded. Spoil in forest will be stacked, shaped, and seeded. Depending upon soil type and season of the year, species such as the following can be used: Common bermudagrass, Pensacola bahiagrass, Common lespedeza, Sericea lespedeza, browntop millet, ryegrass, and fescue.

Alteration, modification, or reconstruction of some existing facilities such as bridges, culverts, and pipelines will be necessary to insure proper functioning of planned structural measures. The work on the bridges involves the enlargement of the channel cross section by excavating under the bridge, reinforcing one or more bents of pilings, or lengthening a bridge in order to widen the channel. Work on the culverts involves replacing existing culverts with larger ones, lengthening existing culverts, or lowering the grade of existing culverts. Work on the pipelines involves the lowering or casing of existing pipelines. No bridges, culverts, or pipelines will be relocated.

This alteration, modification, or reconstruction includes, but is not limited to 6 bridges and 11 culverts on State and Federal highways, 67 bridges and 135 culverts on parish and private roads, pipelines at 57 locations, 32 irrigation flumes, 11 watergates, and utility lines and fences at about 137 locations. The work will be done concurrently with channel construction. Disturbed areas will be revegetated following construction. The specific location of existing facilities to be altered are shown on the design profiles and cross sections in the working files. Replacement of any State and Federal highway bridges or culverts will be coordinated with the Louisiana Highway Department early in the design phase prior to construction. Designs will be in accordance with current standards for traffic and type of highway.

There are no relocations of residences or businesses required.

The disposal of all clearing wastes and construction debris will be accomplished by burying, burning, or removal from the construction site. Burying will limit smoke pollution from burning. Burning operations, if necessary, shall be conducted in accordance with the Louisiana Air Control Commission regulations and other applicable laws governing such operations. Noise levels will be monitored and standards of the Occupational Safety and Health Act will be followed.

All construction equipment will be properly equipped with noise resinators. Because of the type of work to be performed, this equipment will be widely dispersed throughout the watershed, rather than concentrated at any one location. Equipment will not be permitted to work when conditions are such that satisfactory control of soil erosion, water, air, and noise pollution cannot be accomplished.

The data presented below summarizes the preproject and post-project conditions for fish habitat that is modified by construction.

PREPROJECT

Flow Conditions	Miles	Acres	Standing Crop	Total Pounds
Intermittent	5	20	25 lbs/ac	500
Ponded	6	19	70 lbs/ac	1,300

POSTPROJECT

Flow Conditions	Miles	Acres	Standing Crop	Total Pounds
Intermittent	4	21	25 lbs/ac	525
Ponded (existing)	6	19	70 lbs/ac	1,330
Ponded (weirs)	12a/	33	15 lbs/ac	495

a/ Two miles of existing ponded water will be improved aquatic habitat because of installation of a weir in shallow ponded water which will increase the depth of the existing water in Channel L-1B from less than 1-foot average depth to an average depth of 2 feet.

Ninety acres of forest land habitat will be cleared for channel rights-of-way. This acreage includes the clearing for the berm, spoil, and channel enlargement. The existing acreage in channels was not included in this total because the channel proper contains only small diameter, woody vegetation or no woody vegetation.

The 90-acre loss of forest land habitat will be minimized by planting hardwood seedlings on the 34 acres of spoil in forest land. It will be vegetated with grasses which will provide forage for forest wildlife species. The 41 acres converted to berms in the forest land will have to be kept relatively free of trees for maintenance purposes. The 34 acres of spoil that will be planted in hardwood seedlings represents the entire amount available for planting in the forest land. Seedlings of the following species will be used depending on the soil types and availability: water oak, sweet pecan, and willow oak. The seedlings will be planted the first dormant season after the grass sod is established. If the grass is established during the early part of the dormant season, it would be possible to plant the seedlings the latter part of the same season. A small area will be "scraped" where 1- or 2-year old seedlings will be planted.

The following specific measures will be used to eliminate or minimize adverse effects to the plant, animal, and aquatic resources.

1. Excavation in forest land will be limited to the side of the channel with the poorest quality habitat with consideration given to providing the most shade possible to the ponded water channels.

2. Excavation in forest land habitat will be minimized.

3. Selected trees will be left on the berms and channel banks for aesthetic and wildlife purposes. (See appendix G, figures 5 and 6.)

4. Investigations conducted during the development of the Work Plan indicate that channel excavation will not be required on the lower ends of the surveyed channels tributary to Bayou Plaquemine Brule and Bayou Wikoff before their confluence with the main outlet. During the design stage, many of the 47 unsurveyed channels that indicate channel work on the project map for their entire length will be found to be adequate near the main bayous and require no work.

5. Disturbed areas caused by construction will be revegetated with a ground cover and planted with seedlings beneficial to wildlife species.

6. Structures for water control (weirs) will be installed prior to any upstream channel work.

Land Use Changes

Land use changes in the watershed from "without-project" to "with-project" conditions are expected to be as follows:

	Present		Future Without		Future With	
Land Use	Acres	Percent	Acres	Percent	Acres	Percent
Cropland	176,000	75	178,400	76	177,959	76
Pastureland	11,100	5	8,800	4	8,586	4
Forest Land	25,100	11	23,500	10	23,410	10
Other[a]	22,200	9	23,700	10	24,445	10
Total	234,400	100	234,400	100	234,400	100

a/ Includes roads, channels, bayous, lakes, communities, farmsteads, rights-of-way, etc.

The preceding tabulation reflects permanent land use changes from one category to another. Approximately 1,928 acres of land will be

disturbed during the installation of channel work. Of the total acres that will be disturbed, 1,088 acres are presently occupied by channel rights-of-way. Under "Future Without Project Conditions" there will be 738 acres in open land, 119 acres in forest land, 231 acres in wooded channel banks being taken up by channel rights-of-way (channels, berms, and spoil). "Future With Project Conditions" will require that 1,392 acres in open land, 209 acres in forest land, and 327 acres in wooded channel banks be taken up by channel rights-of-way. Project installation will cause an additional 654 acres of open land, 90 acres of forest land, and 96 acres of wooded channel banks to be occupied by channel rights-of-way. These changes indicate there will be an overall increase in the "other land" category because of additional rights-of-way requirements in open land and forest land. However, since wooded channel banks and existing channels, berms, and spoil are already in the "other land" category, an increase will not occur because this is a change within the same land use.

A summary of the changes reveals that there are at the present time 1,088 acres of land in the watershed taken up by the channel rights-of-way, which will increase to 1,928 acres with the project. The following data summarizes the preceding discussion by wildlife habitat types:

Future Without Project		Future with Project	
Land Use	Acreage in Channel R.O.W.	Land Use	Acreage in Channel R.O.W.
Open Land	738	Open Land	1,392
Forest Land	119	Forest Land	209
Wooded Channel Banks	231	Wooded Channel Banks	327
Total	1,088	Total	1,928

There are no properties listed in the National Register of Historic Places that will be affected by the installation of structural measures.

Should any archaeological or historical sites be discovered during the installation of structural measures, construction will be stopped. The Secretary of Interior (National Park Service), the Curator of Anthropology, and the Historical Preservation Officer will be notified, and will be given an opportunity to evaluate and make recommendations for salvage or mitigation before construction continues. Also, the Advisory Council on Historic Preservation will be afforded an opportunity to comment in accordance with the "Procedures for the Protection of Historic and Cultural Properties."

The State Historic Preservation Officer's letter dated January 9, 1975 states that his department does not know of any sites on the National Register which would be affected by this proposed project.

Operation and Maintenance

Operation and maintenance of all phases of the completed project will be the responsibility of the appropriate Sponsor. The Acadia and St. Landry Soil and Water Conservation Districts, with technical assistance from the Soil Conservation Service, will assist and encourage landowners to install and maintain land treatment measures. The objectives will be to maintain adequate drains, ground cover, and other practices which will protect and conserve soil and water resources.

Operation and maintenance of all phases of the completed structural measures will be the responsibility of the individual drainage districts. In addition to maintaining the 250 miles of channels with appurtenant structures proposed in the plan, they will continue to maintain the present flow conditions of the additional 126 miles of channels that are now adequate as indicated on the Project Map, Appendix C. There are 206 miles of channels and appurtenant structures in Acadia Parish and 44 miles in St. Landry Parish. The methodical operation and maintenance of structural measures will insure proper functioning of these measures and realization of benefits.

The present district maintenance tax for drainage is considered adequate for maintaining channels and associated works. Should these funds prove inadequate, the Sponsors have agreed to provide additional financing by an increase in revenue from normal taxing procedures.

Channel maintenance includes periodic cleanouts necessary to restore channels to their planned capacities, repair of bank erosion, control of vegetation, and repair or replacement of appurtenant structures. Maintenance of structures for water control and grade stabilization structures include repairing rills around headwalls or wingwalls, replacing rock riprap as needed, maintaining or replacing vegetation on fills, repairing or replacing worn or broken parts, replacing short-life parts and all other activities essential to the safety and functioning of the structure. Improvement of the aesthetics of the channel and structure sites shall be considered an important feature of the maintenance program.

Annual operation and maintenance expenses for the 250 miles of project channels, including the replacement of worn out or obsolete parts, are estimated to be $87,000. The annual cost for Acadia Parish is $72,200, and for St. Landry is $14,800. The estimated

cost for maintaining the 126 miles of adequate channels is $75,000, of which $60,400 is for Acadia Parish and $14,600 is for St. Landry Parish. These two parishes will incur this total cost and will maintain these channels at adequate capacity.

Existing public roads, farm roads, turn rows, trails, open areas, and other existing facilities will be used for maintenance equipment to reach the channels. Sufficient access will be available to properly maintain all channels. The channels will be kept clear of excessive vegetation by mowing, hand labor, and use of approved herbicides. These herbicides will be used in areas where mowing and hand labor are not practical. Spraying will be accomplished in the summer months when the ephemeral channels and the intermittent channels are most likely to have the least flow. Spraying during these months will lower the probability of runoff carrying undegraded herbecides into other areas. Eroded banks, side inlets, and other appurtenances will be repaired when in need. Localized sediment accumulations in channels, with and without weirs, will be removed periodically by mechanical means.

Vegetation remaining on channel banks not disturbed during construction will be maintained. Trees left in channel rights-of-way for landscape purposes and those planted on spoil banks in the forest areas will not be destroyed by maintenance methods. Two complete mechanical cleanouts are anticipated during the life of the project. The amount of sediment to be removed each time will be small enough to be placed and smoothed on the channel berm.

Provisions will be made for representatives of the Soil Conservation Service, the Louisiana Department of Public Works, and the Sponsors to have free access to all portions of the project measures at any reasonable time for the purpose of inspection, repair, and maintenance. The Sponsors, together with representatives of the Soil Conservation Service, will make a joint inspection annually, after severe storms, and after the occurrence of any other unusual condition that might adversely affect the structural measures.

These joint inspections will continue for 3 years following installation of the structural measures. Inspection after the third year will be made by the Sponsors. They will prepare an annual report and send a copy to the Soil Conservation Service. Items of inspection will include, but will not be limited to (1) conditions of vegetative cover and growth, (2) need for removal of sediment bars and debris accumulations (3) brush control in channels, (4) structures for water control (pipe drops and weirs), and (5) general conditions.

The Sponsoring Local Organization fully understands its obligation for operation and maintenance and will execute a specific operation and maintenance agreement with the Soil Conservation Service prior to the execution of the project agreement for the installation of project measures. An example of an Operation and Maintenance Agreement for structural measures and an Operation and Maintenance Plan for Channels is shown in appendix I.

Project Costs

The total installation cost of the project is estimated to be $8,406,800 of which $3,349,300 is for land treatment measures and $5,057,500 is for structural measures. Of the total $8,406,800, $3,492,880 will be borne by Public Law 566 funds and $4,913,920 by other funds. The total construction cost of structural measures is $3,098,800 of which $2,420,600 will be borne by Public Law 566 funds and $678,200 by other funds.

ENVIRONMENTAL SETTING[1/]

Physical Resources

The Bayou Plaquemine Brule Watershed contains 234,400 acres in southwestern Louisiana. Approximately 200,000 acres are in Acadia Parish and 34,400 acres are in southwestern St. Landry Parish. The boundary is the natural divide surrounding the drainage area of Bayou Plaquemine Brule.

Five cities, towns, and villages are situated wholly or partially within the watershed. Crowley, the parish seat of Acadia Parish, has a population of 17,200; Church Point has a population of 3,900; Estherwood has a population of 700. Approximately 90 percent of Rayne, which has a population of 9,500, is in the watershed. Less than 5 percent of Opelousas, which has a population of 20,000 and is the parish seat of St. Landry Parish, is in the watershed.

Other important cities are within easy access of the area. Baton Rouge, the State capitol, is 70 miles east; Lafayette, an important petroleum center, is 15 miles southeast; Lake Charles, an important industrial and shipping center, is 35 miles west.

Federal Highways 90, 190, and I-10, traversing the watershed, provide easy access to the east and west. Several State highways and parish roads provide access between points inside the watershed and to points outside the watershed, especially to the north and south.

The southwestern half of the watershed is in the Gulf Coast Prairie Land Resources Area; the other half is in the Southern Mississippi Valley Silty Upland Land Resource Area.[2/] The Prairie formation of the Pleistocene Series is the basic formation underlying the watershed.[3/] A thin mantle of loess overlies the Prairie formation in the Southern Mississippi Valley Silty Upland section.

1/ All information and data, except as otherwise noted by reference to source, were collected or compiled during watershed planning investigations by the Soil Conservation Service and Forest Service, U.S. Department of Agriculture.

2/ U.S. Department of Agriculture, Land Resource Regions and Major Land Resource Areas of the United States, Handbook No. 296 (Washington: U.S. Government Printing Office, 1965), pp. 59 and 69.

3/ Rufus J. LeBlanc, Geologic Map of Louisiana, a map compiled from several sources of data, Baton Rouge, Louisiana, 1948.

SETTING

The watershed is in the Mermentau River Basin of the Lower Mississippi Region.[4/] It is typical of the prairie section of southwest Louisiana. Flooding and drainage problems are similar to those of almost all flatland areas. However, the proportional area of open land that has headwater flooding is smaller than is typical in alluvial valleys. The surface is slightly undulating and the major streams have depressed forested flood plains which are adequate outlets for agricultural drainage.

Approximately 124,400 acres of agricultural land have crops damaged by flooding and poor drainage, which are the result of inadequate channel capacities of some of the tributaries of Bayou Plaquemine Brule. Road and bridge damages occur on inadequate channels. Church Point and Crowley have occasional flood damages in urban areas.

As a basis for conservation planning, the soils are grouped in accordance with the soil capability classification system.[5/] These groupings are based on the limitation of the soil, damage risk, and response of crops to treatment. In the capability system, all soils are grouped at three levels--the capability class, the subclass, and the unit.

Capability Classes, the broadest group, are designated by Roman numerals I through VIII. In Class I are soils that have few limitations, the widest range of use, and the least risk of damage when they are used. The soils in the other classes have progressively greater natural limitations. In Class VIII are soils and landforms so rough, so shallow, or otherwise so limited that they do not produce worthwhile yields of crops, forage, or wood products. Classes I, II, and III are suitable for cropland, Class IV is marginal, and Classes V-VIII are unsuited for cropland.

Capability subclasses are soil groups within one class; they are designated by adding a small letter, "e" or "w" to the class numeral. The letter "e" shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; "w" shows that water in or on the soil interferes with plant growth or cultivation.

4/ U.S. Department of Agriculture, Soil Conservation Service, Atlas of River Basins of the United States, (2nd Edition; Washington: U.S. Government Printing Office, 1970), Map No. 14.

5/ A. A. Klingbeil and P. H. Montgomery, "Land Capability Classification," U.S. Department of Agriculture, Soil Conservation Service, Agriculture Handbook No. 210 (1961), p. 21.

SETTING

The general soil map of the watershed, page 29, shows the location of soil associations. The associations are Crowley-Midland, Patoutville-Jeanerette, Olivier-Loring, Acadia-Wrightsville, Wet Alluvial Land, and Memphis-Loring.

The Crowley-Midland association comprises 45 percent of the watershed. Crowley soils are somewhat poorly drained, have loamy surface layers and clayey subsoils, and occur on nearly level, low ridges. Midland soils are poorly drained and have loamy surface layers and clayey subsoils. They occur in depressions in flat areas. The Midland soils and most Crowley soils are in Capability Class IIIw. The native vegetation on these soils was tall prairie grasses, but now they are used to grow rice and soybeans.

The Patoutville-Jeanerette association comprises 44 percent of the watershed. These are somewhat poorly-drained soils that are loamy throughout. They occur on the nearly level, low ridges and narrow depressions and are in Capability Class IIw. The native vegetation was tall prairie grasses and scattered clumps of hardwood trees (savannas); they are used now to grow rice, soybeans, cotton, and sweet potatoes.

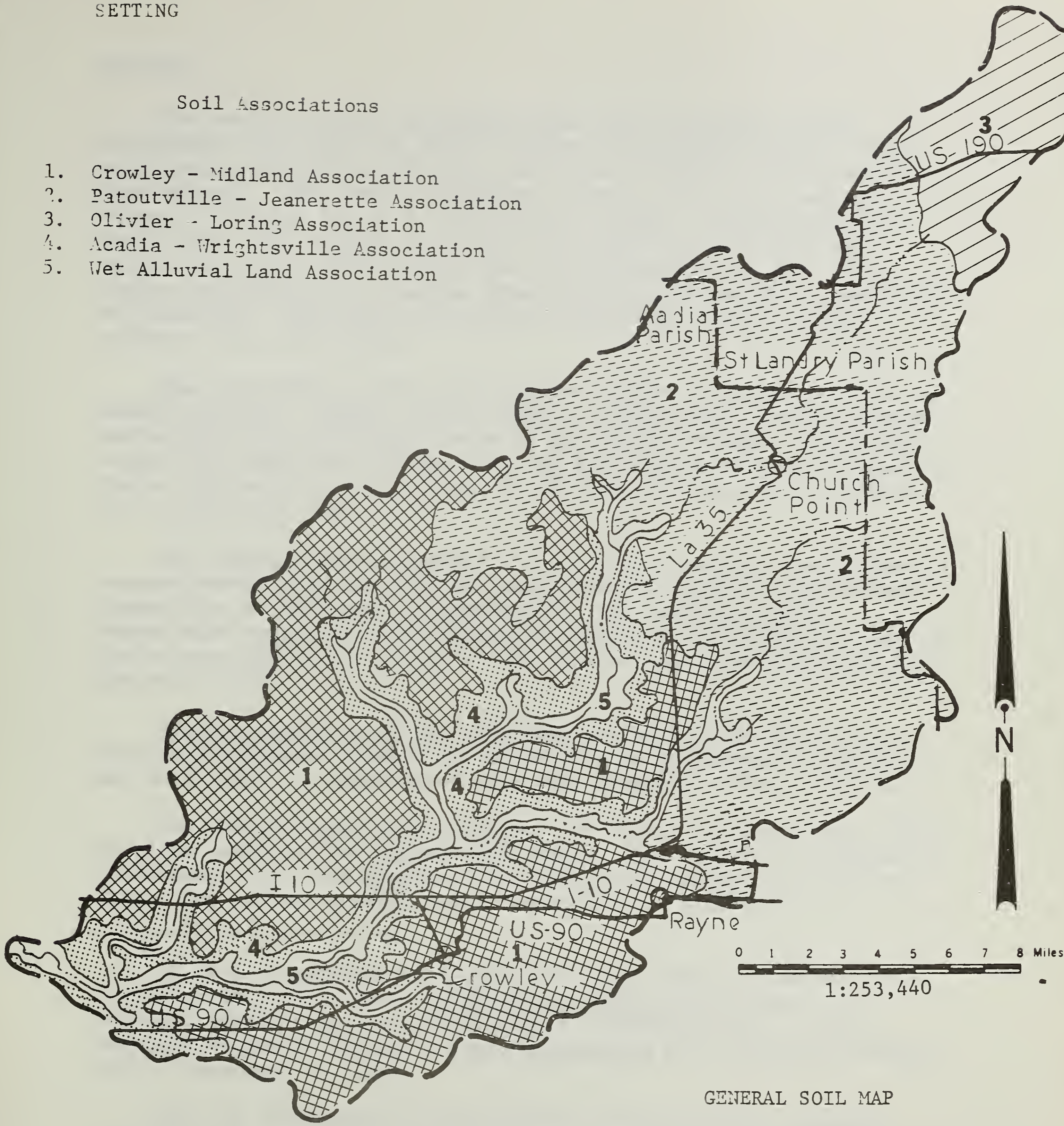
The Olivier-Loring association comprises 4 percent of the watershed. Soils are nearly level to gently sloping and are loamy throughout. Olivier soils are somewhat poorly drained and are in Capability Class IIw. Loring soils are moderately well drained and are in Capability Class IIe. The native vegetation was bluestem grasses with scattered pines and clumps of hardwoods. The soils are now being used for row crops, pasture, and forest.

The Acadia-Wrightsville association comprises 3 percent of the watershed. The soils occur along the narrow, wooded valleys of Bayou Plaquemine Brule and its larger tributaries. Acadia soils are somewhat poorly drained and have loamy surface layers and clayey subsoils. They are on both the level and gently sloping areas. They are in Capability Class IIIw on the level areas and Capability Class IIIe on the gently sloping areas. Wrightsville soils are level or depressed, poorly drained, and in Capability Class IIIw. They have loamy surface layers and clayey subsoils. The native vegetation was pine and hardwood trees; but much of the level and gently sloping land has been cleared and is now in rice, soybeans, and pasture. The steeper slopes are generally forested.

The Wet Alluvial Land association comprises 3 percent of the watershed. The soils of this association occur in the narrow flood plains of local streams at low elevations. Soil texture ranges from silt to clay. Frequent flooding and poor drainage are the main limitations. The soils are in Capability Class Vw. The native vegetation was hardwoods, which are used now for timber production, hunting, and grazing. A small amount of the forest has been cleared for pasture and soybeans.

Soil Associations

1. Crowley - Midland Association
2. Patoutville - Jeanerette Association
3. Olivier - Loring Association
4. Acadia - Wrightsville Association
5. Wet Alluvial Land Association



GENERAL SOIL MAP

BAYOU PLAQUEMINE BRULE WATERSHED

Acadia and St. Landry Parishes
Louisiana

U. S. Department of Agriculture
Soil Conservation Service
Alexandria, Louisiana

September 1974

Compiled from SCS General Soil Maps of
Acadia and St. Landry Parishes

SETTING

The Memphis-Loring association comprises 1 percent of the watershed. The soils are gently sloping to strongly sloping. The well-drained Memphis soils have a silt loam surface with a silty clay loam subsoil. They are in Capability Class I on 0- to 1-percent slopes, and Class IIe on 1- to 3-percent slopes. Loring soils are moderately well drained and have a silt loam surface layer and silty clay loam subsoil. They are in Capability Class IIe. The native vegetation was bluestem grasses with scattered pines and clumps of hardwoods. The soils are used now for cotton, small grains, soybeans, hay, and forest.

The topography of the major portion of the watershed is level to gently sloping. Steeper slopes occur in transitions from the terrace surface to the lower flood plains of the larger streams. Elevations range from about mean sea level in the flood plain of Bayou Plaquemine Brule near the watershed outlet, to 70 feet above mean sea level in the northernmost part.

The average annual rainfall of 58 inches is evenly distributed by seasons except that the fall has only about 12 inches. The average temperature is 68 degrees Fahrenheit.[6/] The average monthly temperature ranges from 52 degrees in January to 82 degrees in July.[7/] The average frost-free period of 265 days extends from February 28 to November 20.[8/]

Mineral resources of the watershed are limited to oil and gas, which are abundant. Almost all production is influenced by faults and anticlines. A deep-seated salt dome probably exists at Crowley.

The Chicot Ground Water Aquifer, one of the largest in the State, supplies municipal and agricultural water. The aquifer is composed of Pleistocene sands and gravels. The Evangeline Aquifer is below the Chicot and has salty water under almost all the watershed.

6/ U.S. Department of Agriculture, Soil Conservation Service, Letter to the States about ENG-Hydrology-Directives, Chapter 21, National Engineering Handbook-Section 4 - Hydrology-Part 1 (South Regional Technical Service Center, Engineering and Watershed Planning Unit), September 16, 1965.

7/ U.S. Department of Agriculture, Forest Service, A Forest Atlas of the South (Southern Forest Experiment Section-New Orleans, Louisiana and Southeastern Forest Experiment Station-Asheville, North Carolina, 1969), pp. 22 and 23.

8/ U.S. Department of Agriculture, Climate and Man - 1941 Yearbook of Agriculture (Washington: U.S. Government Printing Office, 1941), pp. 900-901.

SETTING

The following tabulations show a driller's log and chemical analysis of water from wells at Crowley.[9] Both wells draw from the Chicot Aquifer.

Driller's Log of Well Ac-169

Material	Thickness (feet)	Depth (feet)
Clay	19	19
Sand, fine	19	38
Clay	22	60
Gumbo (Saturated clay)	37	97
Sand, fine	22	119
Sand	19	138
Sand, coarse	37	175
Sand and gravel	19	194
Gravel	86	280

Chemical Analysis of Water from Well Ac-170
(Results in parts per million except as indicated)
Date of Collection: October 14, 1959

Silica (SiO_2)	31	Dissolved solids:	
Iron (Fe)[a]	.11	Calculated (Sum)	400
Iron (Fe)[b]	1.7	Residue on evaporation at 180°C	424
Manganese (Mn)	.01	Hardness as $CaCO_3$	219
Calcium (Ca)	53	Noncarbonate hardness	-
Magnesium (Mg)	21	Percent sodium	39
Sodium (Na)	66	Specific conductance	
Potassium (K)	2.2	(micromhos at 25°C)	669
Bicarbonate (HCO_3)	403	Color[c] (cobalt units)	30
Carbonate (CO_3)	-	Carbon dioxide (CO_2), calc.	-
Sulfate (SO_4)	1.8	pH (Lab.)[c]	7.3
Chloride (Cl)	25	Temperature (°F)	72
Fluoride (F)	.2		
Nitrate (NO_3)	.1		
Phosphate (PO_4)	.3		
Boron (B)	.04		

a/ In solution at time of analysis.
b/ Total amount of iron in sample; presumably in solution when collected.
c/ Not in parts per million.

9/ J. L. Snider, M. D. Winner, Jr., I. B. Epstein, Ground Water for Louisiana's Public Supplies (Baton Rouge: Louisiana Department of Public Works, 1962), p. 12.

The watershed contains large acreages of cropland with smaller amounts of pastureland and forest land. (See Land Use tabulation on page 21).

Crop and pasture plants have replaced the original prairie and savanna vegetation on most of the Pleistocene Terrace Deposits. Forests of the oak-gum-cypress type cover the major flood plains. The small areas of the Pleistocene Terrace Deposits near the flood plains support loblolly pine type stands, with associated species of sweetgum, hackberry, water oak, and hickories.

The open land that is not under cultivation is in pasture. Climax vegetation of the prairie includes Indiangrass, big bluestem, pinehill bluestem, Eastern gamagrass, switchgrass, paille fine, fall panicum, giant cutgrass, and sedges. Climax vegetation of the savannas includes bluestem grasses, pines, and hardwoods. Pastures contain carpetgrass, vaseygrass, bermudagrass, dallisgrass, ryegrass, goat weed, wild millet, sedges, lespedezas, and clovers.

The overstory in the forests on the Acadia-Wrightsville soil association is mixed pines and hardwoods. Predominant species are loblolly pine, water oak, blackgum, sweetgum, green ash, and hickories. The overstory on the flood plains contains water oak, overcup oak, American elm, sweetgum, black willow, bald cypress, water tupelo, hackberry, and bitter pecan. Understory plants include reproduction from the overstory with honeysuckle, hawthorn, greenbrier, swamp privet, blackberry, rattan, palmetto, switchcane, grasses, ferns, and forbs. Transitional vegetation occurs between forest land and open land and consists mainly of a mixture of understory, reproduction of overstory, and open land plants.

The quality, vigor, and beauty of hardwoods and cypress have deteriorated because the trees of greater commercial value have been harvested and those of lesser value have been left to grow and reproduce. Private landowners, in some cases, have worked to improve their forest management practices to alleviate the deterioration of the forest resource. The multiple ownership and lack of interest appears to preclude any accelerated management. The present uses of the forest land are outdoor recreational activities, and limited timber production. Maintaining the existing forest land for these uses is important to the local people in preserving the quality and quantity of many forms of outdoor recreation.

Bayou Plaquemine Brule, which drains the entire watershed, flows southwesterly from its headwaters near Opelousas to Bayou des Cannes west of Crowley. Flow conditions in Bayou Plaquemine Brule change in a downstream direction from ephemeral to intermittent, then perennial. Photographs on the following page show perennial flow in Bayou Plaquemine Brule. Other channels in the watershed have ephemeral or

Bayou Plaquemine Brule at Louisiana Highway 13 (Perennial flow)

Bayou Plaquemine Brule at Quebodaux Ferry near outlet

intermittent flow. Water drained from ricefields during the growing season sometimes adds to the flow. The average annual runoff is approximately 22 inches.

Before farming became prominent in the waterhsed area, the ground cover was dense grass, scattered brush, and trees. The natural drainage system consisted of a pattern of bayous and wide, shallow natural depressions. As the demand for food and fiber generated more interest in farming, a drainage improvement program was initiated which included enlarging and clearing out these natural depressions. Most of the channels that comprise the present drainage system have previously been dug and, in many cases, more than once. The geometric configuration and alignment of the water courses have been altered. Cleaning of these channels for the past 50 years has resulted in the present outlet system of manmade "drainage ditches." The photographs on page 35 show typical drainage ditches.

An inventory of the existing drainage system was made to determine the type of channels and flow characteristics. The inventory showed that 99 percent by length are manmade or previously modified and 1 percent are in a natural, unmodified condition; 74 percent have ephemeral flow characteristics, 16 percent have intermittent flow, 6 percent have perennial flow, and 4 percent have ponded water. The photographs on page 36 show ephemeral and ponded channels. The lower 24 miles of Bayou Plaquemine Brule has perennial flow. Base flow in the perennial reach is indicated in the following tabulation of approximate minimum flow probabilities at Louisiana Highway 13:[10/]

Average Recurrence Interval Years	Lowest average flow in cfs for the indicated number of consecutive days					
	7	15	30	60	120	183
2	2.3	7.6	28.0	71	149	237
5	.5	1.8	13.0	33	93	151
10	0	.5	7.6	20	78	129

There are 185 ponds in the watershed. Eleven of these ponds and lakes are 5 acres or larger and the remaining 167 ponds are small farm ponds averaging less than an acre in size. The total surface acreage of these smaller farm ponds is about 45 acres which are used mostly as water for livestock and provide a very limited fishery. Eleven of

10/ U.S. Department of the Interior, Geological Survey, and Louisiana Department of Public Works, Water Supply Characteristics of Louisiana Streams, Technical Report No. 1 (Baton Rouge: Louisiana Department of Public Works, April 1963), pp. 104-106.

A typical drainage ditch in open land

An intermittent channel in forest land

An ephemeral channel at a transition from open land to wooded channel banks

An intermittent channel with ponded water in forest land

the larger ponds and lakes comprising 120 surface acres provide water for livestock and fishing. Seven are commercial catfish ponds and comprise 22 acres. Also, there are 19 crawfish ponds with a total of 550 acres. Crawfish ponds acreages were not included in the regular pond category since these areas normally would not have permanent water, and crawfish are considered an agricultural crop.

All soils described on previous pages are subject to aqueous suspension. Portions of all soils are subject to being suspended in a colloidal form. Materials in a colloidal suspension are subject to flocculation and deposition caused by amounts of colloidal matter present, changes in temperature, and changes in the chemical regime of the carrying agent. Land treatment measures that increase soil cover and thereby reduce the amount of erosion are the most effective methods of reducing suspended or colloidal sediment.

The Division of Water Pollution Control of the Louisiana Wild Life and Fisheries Commission has monitored water quality of the Mermentau River for several years. Water samples used in their tests were obtained monthly at the U.S. Highway 90 bridge at Mermentau. The tabulation on page 39 shows the results of 6 years of monitoring the water quality in the Mermentau River.

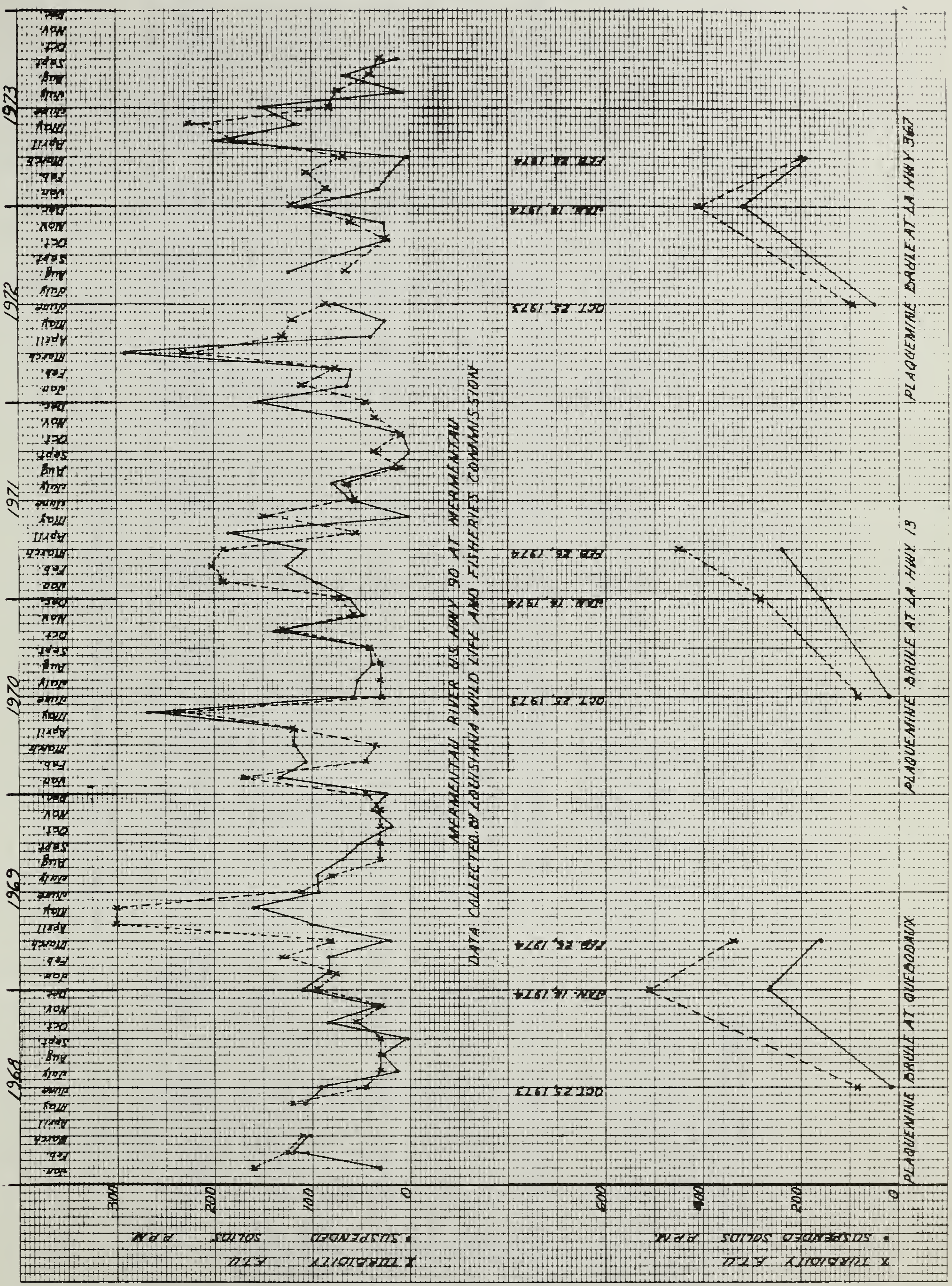
The Mermentau River begins about 1.5 miles downstream from the confluence of Bayou des Cannes and Bayou Plaquemine Brule. Bayou Nezpique and Bayou des Cannes join at this point to form the Mermentau River.

A graph on page 38 shows concentrations of suspended solids and turbidity of water in the Mermentau River during the period January 1968 to September 1973. Also on the same page, graphs show the results of samples taken at three points in Bayou Plaquemine Brule in 1973 and 1974.

The Louisiana Stream Control Commission has described portions of interstate streams, coastal waters, and streams discharging into coastal waters in the State according to present use. The Commission has also established quality standards which apply to these streams and their intrastate navigable tributaries and water bodies. "The quality criteria for waters of Louisiana are based on their present and potential uses and the existing water quality indicated in data accumulated through monitoring programs of various agencies."[11/] Bayou Plaquemine Brule is the only stream classified by the Commission that is in the watershed.

The present uses of water from Bayou Plaquemine Brule are for agricultural uses, propagation of aquatic biota, recreational uses, navigation, and transportation of treated municipal and industrial wastes. The only anticipated change in usage includes primary or supplementary source of supply for municipal and industrial water. General and specific criteria for water quality of Bayou Plaquemine Brule as set forth by the Louisiana Stream Control Commission are presented in appendix E.

11/ State of Louisiana, Louisiana Stream Control Commission, State of Louisiana Water Quality Criteria, 1973, p. 5.


MERMENTAU RIVER US HWY 90 AT MERMENTAU
DATA COLLECTED BY LOUISIANA WILD LIFE AND FISHERIES COMMISSION
PLAQUEMINE BRULE AT LA HWY 367
PLAQUEMINE BRULE AT LA HWY 13
X TURBIDITY FTU
• SUSPENDED SOLIDS P.P.M.
1968
1969
1970
1971
1972
1973

Water Quality Data - Mementau River, U.S. Highway 90 Bridge, Mermentau[a/]
Bayou Plaquemine Brule Watershed, Louisiana

Year		pH (UNITS)	Diss. Oxygen (PPM)	Oxygen Saturation (PERCENT)	Temp (°C)	Turbid-ity (UNITS)	True Color (UNITS)	Susp. Solids (PPM)	Diss. Solids (PPM)	Total Solids (PPM)	Specific Conductance (UMHOS/CM^2)	Total Hardness (PPM)	Total Alkal. (PPM)	Sul-fates (PPM)	Chlorides (PPM)	Sodium (PPM)
1973	Mean	6.6	5.7	63	20	98	76	67	175	242	138	50	48	11	30	13
	Maximum	7.2 S[b/]	7.2 SP	77 S	29 S	225 SP	160 S	200 SP	406 SP	518 SP	285 F	117 SP	115 F	52 W	77 S	41 F
	Minimum	6.1 W	4.0 S	43 SP	10 W	25 F	30 F	2 SP	74 SP	104 W	40 W	24 W	12 W	0 S	9 W	2 W
1972	Mean	6.9	5.9	-	-	101	60	85	158	242	107	32	30	5	23	16
	Maximum	7.9 W	9.5 W	-	-	230 SP	80 SP	292 SP	312 S	584 SP	180 F	60 F	60 F	23 S	43 S	31 SP
	Minimum	6.3 S	3.6 F	-	-	20 W	20 W	24 F	40 F	66 W	48 W	11 W	14 SP	0 W	6 SP	1 W
1971	Mean	6.7	5.3	60	21	87	58	76	182	257	189	49	33	18	24	19
	Maximum	7.8 F	7.4 W	79 S	30 S	203 S	100 F	186 SP	476 SP	554 SP	455 S	196 S	70 S	50 SP	58 W	78 F
	Minimum	6.2 SP	3.2 F	37 F	10 W	10 W	30 S	0 F	40 F	82 F	85 SP	28 F	12 W	2 S	10 F	5 F
1970	Mean	6.5	6.0	66	20	83	50	98	170	268	222	44	45	15	29	25
	Maximum	7.2 S	8.0 F	89 S	32 S	240 SP	80 SP	268 SP	298 SP	430 W	420 S	102 S	120 S	36 F	53 SP	38 S
	Minimum	5.8 SP	3.8 F	46 F	7 W	30 F	20 F	36 S	78 SP	148 F	98 F	16 F	16 F	0 SP	8 F	8 F
1969	Mean	6.6	5.4	57	19	103	42	70	194	264	260	53	43	10	34	25
	Maximum	8.0 S	9.0 SP	96 S	29 S	300 SP	60 SP	160 SP	250 SP	364 SP	424 W	87 S	97 F	47 W	72 F	43 F
	Minimum	5.5 F	2.0 F	20 W	8 W	30 F	20 F	18 F	156 F	174 F	74 SP	19 SP	11 SP	0 SP	10 SP	8 SP
1968	Mean	6.8	7.5	80	19	75	37	65	197	262	288	46	45	15	34	29
	Maximum	7.9 S	10.6 S	122 S	30 S	160 S	55 S	118 W	284 S	376	549 S	82 S	98 S	42 W	49 F	48 S
	Minimum	6.3 SP	4.8 F	51 S	7 W	30 W	20 W	2 W	62 W	172	156 W	24 W	14 W	1 W	14 W	12 W
1968-73	Average															
	Mean	6.7	6.0	65	20	91	54	77	179	256	201	46	41	12	29	21
	Maximum	7.7	8.6	93	30	226	89	204	338	452	386	107	93	42	59	47
	Minimum	6.0	3.6	39	8	24	23	14	75	124	84	20	13	13	10	5

a/ Unpublished Data. Louisiana Wild Life and Fisheries Commission. Division of Water Pollution Control.

b/ Sp = March, April, May
S = June, July, May
F = September, October, November
W = December, January, February

Approximately 12,272 acres of wetland in the watershed include 12,130 acres of Type 1 (seasonally flooded hardwoods) and 142 acres of Type 5 (ponds or reservoirs). The types are defined by the Fish and Wildlife Service.[12/]

Type 1 wetlands occupy the flood plains of Bayou Plaquemine Brule, Bayou Blanc, Bayou Jonas, Long Point Gully, and Bayou Wikoff. Type 5 wetlands consist of scattered ponds.

Plant and Animal Resources

Fisheries of the watershed produce moderate amounts of commercial species and small amounts of game species. Bayou Plaquemine Brule and some of its tributaries such as Bayou Jonas, Bayou Wikoff, Bayou Blanc, and Long Point Gully are the major channel fisheries. These channels provide approximately 97 miles and 630 acres of fish habitat. Flow velocities in these channels are generally very slow except during heavy runoff when they may be 2 to 4 feet per second.

Farm ponds, borrow pits, and one small lake are the important pond fisheries. These ponds have 142 acres total surface area and an estimated standing crop of 150 pounds of fish per acre. They contain largemouth bass, bluegill, channel catfish, and yellow bullhead.

The channel fisheries were evaluated by stream reaches. The lower reach of Bayou Plaquemine Brule includes Bayou Plaquemine Brule and its minor tributaries downstream from Louisiana Highway 365, and Bayou Blanc and its tributaries. Bayou Plaquemine Brule is a perennial stream in the 24-mile reach downstream from Louisiana Highway 98, and is intermittent in the upper 7-mile reach. It contains 230 acres of water in the perennial reach. The channel has been previously modified, but the banks support vegetation in the manner of natural channels of the locality. The channel is 80 to 150 feet wide and 8 to 20 feet deep. Poor water quality as a result of high values for turbidity, suspended solids, color, and to a lesser extent phosphate, nitrogen, and sulfide in this reach is reflected in the water quality data presented on pages 39 and 41. Refer to appendix D for a discussion of how and why these parameters affect water quality and aquatic organisms. Bayou Plaquemine Brule has an average standing crop of 130 pounds of fish per acre. Fish populations in Bayou Plaquemine Brule were sampled in June 1973 by biologists of the Louisiana Wild

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12/ U.S. Department of the Interior, Fish and Wildlife Service, Wetlands of the United States, Circular C-39 (Washington: U.S. Government Printing Office, 1956), pp. 20-22.

WATER QUALITY DATA FOR PLAQUIMINE BRULE WATERSHED
(1973-1974)

PARAMETERS	SAMPLE DATE	STATION NO. 1[a]	STATION NO. 2[b]	STATION NO. 3[c]	STATION NO. 4[d]	STATION NO. 5[e]	STATIONS 1-5 AVERAGE
COLOR	10/25/73	200	220	255	g/	g/	225
(apparent)	1/14/74	1250	720	1165	1225	g/	1090
Units	2/26/74	1070	1320	560	810	640	880
Average[f]		840	753	660	1018	640	732
HARDNESS	10/25/73				g/		
mg/l as $CaCO_3$	1/14/74	46	38	40	48	g/	43
	2/26/74	40	50	130	148	92	93
Average[f]		43	44	85	98	92	68
NITROGEN, AMMONIA	10/25/73	0.37	0.05	0.0	/	g/	0.14
mg/l N	1/14/74	2.7	1.25	2.22	2.8	g/	2.24
	2/26/74	2.5	2.8	2.2	1.7	1.8	2.2
Average[f]		1.85	1.36	1.47	2.25	1.8	1.52
NITROGEN, NITRATE	10/25/73	0.08	0.24	0.9	g/	g/	0.2
mg/l N	1/14/74	.23	.21	0.23	0.22	g/	.22
	2/26/74	.35	.27	1.4	.53	0.43	.59
Average[f]		.22	.24	0.84	.37	.43	.33
OXYGEN	10/25/73	3.0	12.0	4	g/	g/	6.3
mg/l O_2	1/14/74	7.0	8.0	9	8	g/	8.0
	2/26/74	7.0	6.0	8	8	10	7.8
Average[f]		5.7	8.7	7	8	10	7.4
pH	10/25/73	6.5	8.5	7.5	g/	g/	7.5
Units	1/14/74	7.0	7.0	7.0	7.0	g/	7.0
	2/26/74	7.0	7.0	7.5	7.5	7.5	7.3
Average[f]		6.8	7.5	7.3	7.2	7.5	7.3
PHOSPHATE, ORTHO	10/25/73	1.2	0.9	0.88	g/	g/	0.99
mg/l PO_4	1/14/74	1.61	1.21	1.55	1.6	g/	1.49
	2/26/74	1.5	1.5	1.33	1.1	0.9	1.26
Average[f]		1.43	1.2	1.24	1.35	.9	1.24
SULFATE	10/25/73	5.0	0	85	g/	g/	30
mg/l SO_4	1/14/74	0.0	3	0	0	g/	.75
	2/26/74	0.0	0	33	0	0	6.6
Average[f]		1.6	1	39	0	0	12.5
SULFIDE	10/25/73	0.08	0.08	0.11	g/	g/	0.09
mg/l S	1/14/74	.46	0.3	.48	0.48	g/	.43
	2/26/74	.35	0.5	.3	.28	0.14	.31
Average[f]		.29	0.29	.29	.38	.14	.27
SUSPENDED SOLIDS	10/25/73	19	20	50	g/	g/	26
mg/l	1/14/74	265	160	320	210	g/	239
	2/26/74	160	240	190	110	105	161
Average[f]		148	140	187	160	105	142
TEMPERATURE	10/25/73	g/	g/	g/	g/	g/	g/
°F	1/14/74	60	60	65	65	g/	63
	2/26/74	65	56	54	44	50	54
Average[f]		63	58	58	55	50	58
TURBIDITY	10/25/73	85	85	98	g/	g/	89
FTU's	1/14/74	510	285	410	460	g/	416
	2/26/74	340	450	200	280	230	300
Average[f]		312	273	236	370	230	268

a/ Bayou Plaquemine Brule at Quebodaux Ferry, West of Crowley.
b/ Bayou Plaquemine Brule at Highway 13 Bridge, North of Crowley.
c/ Bayou Plaquemine Brule at Highway 367 Bridge, Northwest of Rayne.
d/ Long Point Gully at Highway 98 Bridge.
e/ Bayou Wikoff at Highway 35 Bridge, North of Rayne.

f/ Average reading for sampling period and does not reflect annual average.

g/ Data not available.

Life and Fisheries Commission and the Soil Conservation Service. Two 1-acre fish population samples were taken in the lower reaches of Bayou Plaquemine Brule about 1.5 miles downstream from Quebodaux's Ferry. The average standing crop of the two samples was 130 pounds of fish per acre. Game fish included only 20 pounds of fish per acre or 15 percent of this total poundage. Game fish species present include crappie, bluegill, and warmouth. Commercial species comprised the majority of the fisheries with 104 pounds per acre or 80 percent of the standing crop. The remaining 6 pounds or 5 percent of the fisheries consisted of forage fish. Commercial species comprised the majority of the standing crop basically because of the poor water quality. These species include yellow bullhead, channel catfish, blue catfish, smallmouth buffalo, carp, drum, bowfin, gar, and shad. Refer to the tabulation on the following page for detail sampled data.

Bayou Blanc contains 40 acres of poor quality ponded water in its lower 7 miles. The ponded water has an estimated 70 pounds of fish per acre. The remaining stream reaches have ephemeral flow. Ephemeral channels in the watershed do not produce significant amounts of fish, but they produce some important fish food organisms.

Bayou Jonas has 38 acres of ponded water in its lower 9 miles. The channel is 30 to 40 feet wide and 4 to 8 feet deep. The water, which has high concentrations of suspended solids, high color, and high turbidity, contains an estimated 65 pounds of fish per acre. The remaining reaches of Bayou Jonas and its tributaries have ephemeral flow.

Bayou Wikoff has intermittent flow in the lower 22 miles with an estimated 20 pounds of fish per acre. The channel, which has been previously modified, is 10 to 50 feet wide and 2 to 8 feet deep. The remaining reaches of Bayou Wikoff and its tributaries have ephemeral flow.

The lower reaches of Long Point Gully and Gumpoint Gully have similar fisheries. Long Point Gully has 7 miles of intermittent channels and Gumpoint Gully has 1 mile of intermittent channel. The channels, which have been previously modified, are 20 to 70 feet wide and 3 to 6 feet deep. The intermittent channels have an estimated 15 pounds of fish per acre. The remaining reaches of Long Point Gully and Gumpoint Gully along with Prather Gully, Cole Gully, Blaise Lejeune Gully and their tributaries have ephemeral flow. Photographs on page 44 show examples of ephemeral and intermittent channels with wooded channel banks.

Bayou Plaquemine Brule upstream from Louisiana Highway 98, has 16 miles of intermittent flow; Deep Gully has 1 mile of intermittent flow. Bayou Plaquemine Brule in this reach is 15 to 100 feet wide and 3 to 20 feet deep. The intermittent channels have an estimated 25 pounds of fish per acre. The remaining reaches have ephemeral flow.

Public access to Bayou Plaquemine Brule is available at three boat launching ramps and most road crossings. Access to the other

Standing Crop of Fish Per Acre
in Bayou Plaquemine Brule[a]
(June 1973)

	Available Size		Intermediate Size		Fingerlings	
	No./Ac.	Lbs./Ac.	No./Ac.	Lbs./Ac.	No./Ac.	Lbs./Ac.
Predatory Game Fish						
White Crappie	15.0	5.7	9	10.5	2	0.05
Black Crappie	2.5	1.3	0/	0/	0/	0/
Total	17.5	7.0	9	10.5	2	0.05
Non-Predatory Game Fish						
Bluegill	5	1.5	1.5	0.05	6.5	Trace
Warmouth	2	0.55	3.0	.15	3.0	Trace
Total	7	2.05	4.5	.2	9.5	Trace
Non-Predatory Food Fish						
Carp	13.0	73.9	2	1.3	0/	0/
Smallmouth Buffalo	0.5	1.6	0/	0/	0.5	Trace
Drum	1.5	1.05	1	0.3	0/	0/
Yellow bullhead	1.5	2.25	0/	0/	0/	0/
Total	26.5	78.8	3	1.6	0.5	Trace
Predatory Food Fish						
Blue catfish	5.5	2.65	13.5	1.55	2.0	0.05
Channel catfish	0.5	0.20	1.5	0.30	0/	0/
Shortnose gar	7.5	7.05	10.0	10.20	0/	0/
Bownfin	.5	1.60	0	0/	0/	0/
Total	14.0	11.50	25.0	12.05	2.0	0.05
Forage Fish						
Gizzard shad	11.5	4.5	11.0	1.15	0/	0/
Threadfin shad	0/	0/	0/	0/	32	0.35
Madtom	0/	0/	0/	0/	4	Trace
Total	11.5	4.5	11.0	1.15	36	0.35
GRAND TOTAL	76.5	103.85	52.5	25.50	50	0.45

Total Standing Crop/acre - 129.80 pounds

Source: Unpublished data developed by the Louisiana Wild Life and Fisheries Commission.

a/ Average of two one acre fish population samples.

An ephemeral channel with wooded banks

An intermittent channel with wooded banks

fisheries is limited to roads. Some of the ponds do not have access by all-weather roads.

The existing fisheries of the watershed are used moderately. Commercial fishermen use Bayou Plaquemine Brule more than sport fishermen because it has more commercial fish than sport fish. However, sport fishermen use the lakes and ponds frequently. Residents of Acadia and St. Landry Parishes bought 9,168 fishing licenses for the 1970-71 season.[13/] Although these fishing licenses were sold in these two parishes most of the fishermen go outside of the watershed to fish to places such as Toledo Bend, Cocodrie Lake, Henderson Lake, and the Gulf of Mexico.

No fish species or subspecies that is suspected of being in danger of extinction inhabits the watershed.[14/]

The three major types of wildlife habitat in the watershed are forest land, open land, and wooded channel banks. The photographs on page 46 show two habitat types. The watershed contains an estimated 25,100 acres of forest land. Game species such as white-tailed deer, squirrels, rabbits, woodcock, and waterfowl inhabit the watershed forest. The Louisiana Wild Life and Fisheries Commission plans to stock wild turkey in Acadia Parish in 1974. Forest land also provides habitat for many nongame animal species that serve important ecological functions.

Examples of mammals, birds, reptiles, and amphibians common to the watershed include the following species grouped according to categories:

1. <u>Mammals</u> - white-tailed deer, gray squirrel, fox squirrel, cottontail rabbit, swamp rabbit, raccoon, bobcat, coyote, opposum, nutria, mink, muskrat, striped skunk, gray fox, red fox, armadillo, shorttail shrew, white-footed mouse, red bat, and cotton rat

2. <u>Birds</u> - bobwhite quail, mourning dove, woodcock, snipe, wood duck, mottled duck, fulvous tree duck, mallard, pintail, gadwall, widgeon, blue-winged teal, green-winged teal, snow goose, white-fronted goose, red-shouldered hawk, red-tailed hawk, marsh hawk, screech owl, barred owl, common crow,

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13/ Louisiana Wild Life and Fisheries Commission, <u>14th Biennial Report, 1970-71</u> (New Orleans: Louisiana Wild Life and Fisheries Commission, 1972), p. 28.

14/ Robert R. Miller, "Threatened Freshwater Fishes of the United States," <u>Transactions of American Fisheries Society</u>, No. 2 (Kansas City: Allen Press, 1972), pp. 239-252.

Rice field flooded in winter for waterfowl feeding habitat

Forest land habitat

common egret, snowy egret, little blue heron, green heron, Louisiana heron, pileated woodpecker, red-headedwoodpecker, yellow-billed cuckoo, brown thrasher, robin, mockingbird, Eastern bluebird, blue jay, nighthawk, killdeer, cardinal, Eastern meadowlark, white-throated sparrow, and Carolina wren.

3. Reptiles - common snapping turtle, red-eared turtle, Gulf Coase box turtle, smooth softshell turtle, stinkpot turtle, gray rat snake, Eastern hognose snake, diamond-back water snake, broad-banded water snake, Western cottonmouth, Southern copperhead, cane brake rattlesnake, speckled kingsnake, Eastern garter snake, green anole, Southern fence lizard, five-lined skink, and ground skink.

4. Amphibians - bullfrog, Southern leopard frog, Southern cricket frog, gray tree frog, spring peeper, Fowler's toad, three-toed amphiuma, dwarf salamander, and marbled salamander.

Populations of forest game species other than deer are near the carrying capacity of the habitat. Populations of white-tailed deer should increase if the present level of protection is maintained. Improper cutting of mast-producing hardwoods has reduced the food supply for game species.

The watershed contains an estimated 187,100 acres of open land, including cropland and pastureland. Open land provides primary habitat for quail, doves, snipe, waterfowl, rabbits, and other wildlife species. Populations of open land game species are near the carrying capacity of the habitat.

Cultivated areas such as rice and soybean fields provide excellent feeding grounds for quail, doves, ducks, and geese. Brushy fence rows provide cover for rabbits, quail, and songbirds. Rice-rotational pastures are temporarily productive habitat for species that feed in open land. Fields used in rice rotations do not usually remain out of cultivation for more than 3 years. Strips of woody vegetation along channels in open land provide cover and nesting areas for open land species. This type of habitat is termed "wooded channel banks."

There are 12,272 acres of wetlands as defined in Circular 39. 15/ Of the total 12,272 acres of wetlands, 12,130 acres are classified as Type 1 wetlands and 142 acres as Type 5 wetlands.

Criteria for Type 1 wetlands are set forth in Circular 39. The area must be covered with water or waterlogged for variable seasonal

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15/ U.S. Department of the Interior, Fish and Wildlife Service, *loc. cit.*

periods but reasonably well drained during most of the growing season. Vegetative species usually found in these vary according to the season, depth, and duration of flooding but are in the broad group called bottom land hardwoods. Understory and herbaceous species usually associated with this wetland type are swamp privet, palmetto, cocklebur, chufa, redroot cyperus, fall panicum, smartweed, and wild millet.16/ Because of the lack of proper timber management (high-grading, etc.,) these Type 1 wetlands are not reaching their full potential value as wildlife habitat, especially for waterfowl. All the Type 1 wetlands are along the flood plains of Bayou Plaquemine Brule and its four major tributaries - Bayou Blanc, Bayou Jonas, Long Point Gully, and Bayou Wikoff. Refer to the following tabulation and to the Project Map for locations, configurations, and acreages of Type 1 wetlands.

WETLAND AREAS

Location	Type 1 Wetlands		Type 5 Wetlands		Total
	acres	percent	acres	percent	
Lower Reach of Bayou Plaquemine Brule	8,000	66	59	42	8,059
Bayou Jonas	1,600	13	51	36	1,651
Bayou Wikoff	1,790	15	22	15	1,812
Long Point Gully	740	6	10	7	750
Upper Reach of Bayou Plaquemine Brule	0	0	0	0	0
TOTAL	12,130	100	142	100	12,272

Type 5 wetland areas are scattered throughout the watershed and occur in small acreages ranging in size from 5 to 26 acres and total 142 acres. Photographs on page 49 illustrate Type 1 and Type 5 wetlands.

Criteria for Type 5 wetlands are described in Circular 39. They are shallow, fresh water ponds and reservoirs from 3 to 10 feet deep. They are open water areas which are fringed by a border of emergent vegetation. Aquatic vegetation usually present consists of pondweeds, naiads, coontail, watermilfoils, spatterdocks, stonewarts (chara), lotus, and waterhyacinth. This vegetation serves as food and cover for waterfowl and other wildlife. The fringe of emergent vegetation is high quality nesting habitat for mottled and fulvous tree duck as well as a good source of cover. Also, Type 5 wetlands are used extensively as brooding areas, especially in midsummer or years with dry spring seasons when the less permanent wetlands are dried out.

16/ *Ibid.*

Type 1 wetland in watershed (Seasonally flooded hardwoods)

Type 5 wetland in watershed (Borrow-pit pond)

Appraising values of wetlands has had its primary emphasis on waterfowl production. The values of wetlands should be judged on their entire benefits, not just waterfowl production. Many wetland areas should be maintained solely on the basis of their value as habitat for other forms of wildlife. To illustrate the value of wetlands to other wildlife, of the 23 game and fur animals species, excluding waterfowl found in Louisiana, 20 species used Type 1 wetlands as all or part of their natural habitat.[17/] In addition, hundreds of species of nongame mammals, birds, reptiles, amphibians, insects, and other invertebrates use wetland areas as essential or useful habitat. Although there are no known threatened or endangered species of plants in these wetlands, many rare, beautiful, and unique plant species are found in wetland areas. Following is a list of some plant species found in these wetlands: wild millet, fall panicum, pondweed, naiads, coontail, watermilfoil, muskgrass, waterlily, spatterdock, water-hyacinth, water oak, willow oak, baldcypress, obtusa oak, overcup oak, bitter pecan, water tupelo, red maple, and green ash.

Wetlands as a whole have many values other than essential or valuable habitat for wildlife. Some of the values are (1) retention of surface water for farm use, (2) stabilization of surface runoff, (3) reduction or prevention of erosion, (4) production of timber, (5) natural firebreaks, and (6) outdoor laboratory for students, photographers, and scientists.

Populations and distribution of fish and game in the watershed are listed in the tabulation on the following page.

The estimated 12,700 acres of forest land in the southwestern portion of the watershed (the lower reach of Bayou Plaquemine Brule) provide some of the best forest habitat in the watershed for animals such as swamp rabbits, squirrels, deer, woodcock, wood ducks, and furbearers. Forest land along Bayou Plaquemine Brule averages about one-half mile wide. Water oak, baldcypress, water tupelo, overcup oak, and willow oak are the predominant species in the flood plain.

Almost 8,000 acres of Type 1 wetlands along the lower reach of Bayou Plaquemine Brule provide valuable habitat for waterfowl and furbearers. These areas provide some opportunities for hunting and trapping. They also provide limited frogging, crawfishing, and other outdoor related recreational activities. Wood ducks are more numerous downstream from Highway 13. The numerous cypress trees with cavities in this section are good nesting sites for the wood ducks.

17/ Ibid., pp. 40-43.

CURRENT ESTIMATED GAME POPULATIONS a/

Species	Animals/Acre	Habitat Type & No. of Acres		Total Population
Dove (Migratory)	3/1	Open Land	187,100	561,300
Quail	1/8	Open Land	187,100	23,387
Rabbit	1/3	Open Land & Forest Land	212,200	70,733
Squirrel	1/1	Forest Land	25,100	25,100
Deer	1/220	Forest Land	25,100	114
Waterfowl (Migratory) b/	c/	Open Land, Forest Land, & Water Areas	212,342	23,488
Waterfowl (Resident)	d/	Open Land, Forest Land, & Water Areas	212,342	2,662

a/ Game population data developed in cooperation with the Louisiana Wild Life and Fisheries Commission.
b/ Migratory waterfowl population depends upon breeding success and other favorable conditions in Canada and northern United States.
c/ One bird per 8 acres of open land
One bird per 250 acres of forest
d/ One bird per 75 acres of open land
One bird per 150 acres of forest

CURRENT ESTIMATED STANDING CROP OF FISHES

Category	Acres	Standing Crop/Acre	Pounds of Fishes
Ponds and Lakes	142	150	21,300
Intermittent channels	251	25	6,275
Ponded water	89	70	6,230
Perennial channel (Bayou Plaquemine Brule) a/	290	130	37,700
Total			71,505

a/ Actual standing crop averages of two fish population by Louisiana Wild Life and Fisheries Commission personnel.

The lower reach of Bayou Plaquemine Brule contains an estimated 44,800 acres of open land used mostly for cropland and pastureland. Pastures, depending upon their level of management, provide habitat for quail, rabbits, and doves. Cultivated areas such as rice and soybean fields provide feeding areas for upland game birds and waterfowl. Brushy fence rows and wooded channel banks provide habitat for rabbits, quail, and songbirds.

The remaining portion of the watershed encompasses tributaries and the upper reach of Bayou Plaquemine Brule. There are 12,400 acres of forest land and 141,900 acres of open land in this portion. The vegetation and wildlife species density of this open land is similar to those of the other open land. However, forest lands generally decrease in width and habitat quality, and woodland wildlife species generally decrease in density in an upstream direction.

Access to the existing wildlife resources is limited. All-weather roads provide access to the majority of the area, but most of the land is privately owned and some is posted. There are no State wildlife management areas within the watershed. However, Thistlethwaite Game Management Area is located within a short driving distance. Permission to hunt on some of the private land can be obtained by asking the landowner.

Wildlife resources are well utilized with the migratory species such as ducks, geese, and doves receiving the most hunting pressure in this area. Small game hunting such as squirrel, rabbit, and quail hunting is a popular form of outdoor recreation for the local residents. Acadia and St. Landry Parishes sold 13,835 basic resident hunting licenses and 3,088 big game licenses for the 1970-71 hunting season.[18/]

"Endangered" wildlife species that may occur in Bayou Plaquemine Brule Watershed are: red wolf,[19/] Bachman's warbler, the Southern bald eagle, and the alligator. Bachman's warbler and the Southern bald eagle are both migratory species. "Endangered" wildlife species are those species which are on the verge of extinction. Nearby Lake Arthur is good habitat for the Southern bald eagle, which is a fish-eating bird.

Economic Resources

The industries of any region can be grouped into three broad categories. Basic industries such as farming, mining, and forestry use natural resources to make materials available for processing and

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18/ Louisiana Wild Life and Fisheries Commission, op. cit., p. 26.

19/ U.S. Department of the Interior, Fish and Wildlife Service, United States List of Endangered Fauna, (Washington: U.S. Government Printing Office, 1974).

consumption. Processing and manufacturing industries such as cotton gins, grain elevators, petroleum refining plants, and lumber mills alter materials from the basic industries to make useful products. Service industries such as merchandising, transportation, and medicine provide goods and services to consumers.

Acadia Parish census data for 1970 were used to determine that 21 percent of the employed labor force were engaged in basic industries; 10 percent were in agriculture, 9 percent were in mining, and 2 percent were in forestry and fisheries. Of the remainder of the employed labor force, 18 percent were employed in the processing and manufacturing industries and 61 percent were employed in the service industries.

The watershed population in 1970, estimated to be 43,400, was about 66 percent urban and 34 percent rural. Approximately 33 percent of the populations of Acadia and St. Landry Parishes live in the watershed; approximately 14 percent of the rural populations of the two parishes live in the watershed. In 1970, Acadia Parish had 6.8 percent unemployment. The median family income was about $5,550 in Acadia Parish and $4,920 in St. Landry Parish.20/

The major farm and ranch enterprises are soybeans, rice, cotton, sweet potatoes, and cattle. Industries related to agriculture include cotton gins, grain elevators, flying services, feed mills, rice dryers, rice mills, and retailing of supplies and equipment.

Crop acreages in the problem areas of the watershed include approximately 46,700 acres of soybeans, 34,100 acres of rice, 5,900 acres of sweet potatoes, 4,800 acres of cotton, and 4,300 acres of corn. Land used for beef production consists of 10,600 acres of rice-rotational pasture and 6,000 acres of permanent pasture.

The estimated 25,100 acres of forest land in the watershed is in small privately-owned tracts. Wetness or frequent flooding are the main reasons the forest land has not been developed for agriculture.

Data from the 1969 Census of Agriculture were used in estimating that the watershed contains 800 farms averaging 234 acres. Approximately 90 percent or 720, are owned and operated by families living on the farms.

Agricultural land values in the watershed are approximately $400 to $800 per acre. The values depend on location, soil capability, and improvement.

20/ U.S. Department of Commerce, Bureau of the Census, Census of Population: 1970, General, Social, and Economic Characteristics, Final Report PC (1)-C20, La. (Washington: U.S. Government Printing Office, 1972).

The watershed is in the Lower Mississippi Region Comprehensive Study area and the Southwest Louisiana River Basin Study Area. Data used in the environmental statement were coordinated with data used in the study reports.

Approximately 580 miles of Federal, State, and parish roads in the watershed provide good access to markets under normal conditions. Parts of some roads are flooded after heavy rains. The three railroad companies providing service have loading facilities at several points in the watershed.

The lower 19 miles of Bayou Plaquemine Brule was included as navigation channel improvement by the River and Harbor Act of June 25, 1910. Commerce averaging in excess of 16,000 tons per year has been reported each year since 1966.

Recreational Resources

A 1970 inventory conducted by the Louisiana State Parks and Recreation Commission lists 17 recreation sites in the watershed, all in Acadia Parish. Some are in the "general outdoor" class and the remainder are in the "high density" class, according to the Bureau of Outdoor Recreation's land classification system. Facilities at the sites include baseball diamonds, basketball courts, tennis courts, swimming pools, picnic tables, and boat launching ramps. The sites have good public access and are used moderately.

Water quality analyses have shown no major pollution problems other than suspended sediment and its associated high turbidity, color, and rate of sedimentation in the watershed. Pollution of channels by suspended sediment is prevalent following rainstorms that cause sheet erosion of cultivated land. Localized water and air pollution is caused by improper waste disposal.

Archaeological and Historical Resources

The Curator of Anthropology and the Louisiana Historic Preservation Officer have been contacted concerning known archaeological and historical sites within the watershed. The National Register of Historical Places was also reviewed. No known historical sites are on record within the watershed.

The Soil Conservation Service contracted with Louisiana State University to conduct a survey in order to determine the existence of any archaeological or historical sites that would be affected by installation of structural measures. This survey is complete. No archaeological or historical sites were discovered by this survey that are located within the area to be disturbed by the installation of structural measures.

Soil, Water, and Plant Management Status

Soybeans became a popular crop in the watershed in the middle 1960's. The soybean acreage in Acadia and St. Landry Parishes increased from 64,000 in 1965 to 162,000 in 1970.[21/] Soybean acreage in the problem areas is approximately 46,700. Crops and pasture, and a small amount of forest land, were replaced by the soybeans in the watershed.

Forest land in the watershed is all individually owned. Relatively high marketing costs depress stumpage prices. Timber sales provide small supplementary income to the owners.

The watershed is in the Acadia and the St. Landry Soil and Water Conservation Districts. Soil and water conservation plans have been prepared for 927 district cooperators on 156,585 acres, or 67 percent of the watershed. An estimated 21 percent of the needed conservation measures have been applied. During the last 10 years, landowners have applied conservation measures costing approximately $3,398,000 (see table 1A) on water problem areas as well as nonproblem areas.

The Soil Conservation Service personnel work closely with the soil and water conservation districts in establishing priorities of work to be done. They are actively involved in promoting conservation. The districts announce important activities through newsletters, radio, television, and newspapers. They employ three district aides, a technical aide, a clerk, and a secretary to assist Soil Conservation Service field office personnel. The districts are also actively involved in broad, resource planning and cooperate with various planning bodies.

21/ Lonnie L. Fielder and Clarence O. Parker, Louisiana Crop Statistics by Parishes Through 1970, D.A.E. Research Report No. 436 (Baton Rouge: Louisiana State University and Agricultural and Mechanical College, April 1972), Table 4.

WATER AND RELATED LAND RESOURCE PROBLEMS

Land and Water Management

Soils in the watershed have comparatively low natural fertility, but crops respond well to good management. Because of the nearly level terrain, high rainfall, and slow soil permeability, severe wetness and flooding problems exist.

Rice is usually grown in rotation with soybeans or pasture. Rotations periodically interrupt weed buildup in rice and restore desirable soil conditions. Where wetness and flooding are serious problems, recommended pasture management practices cannot be effectively applied, thereby resulting in poor grazing distribution. Weeds increase, and some areas are so overgrazed that sheet erosion increases.

On other cropland, planting is often delayed in the spring because fields are wet or flooded. In order to decrease land preparation time, many farmers plow their land in the fall after crops are harvested. This allows them to plant earlier the following spring, but it removes crop residues that would serve as soil-protecting mulch. Impact of raindrops on the bare ground detaches soil particles (splash erosion). Runoff removes some of the particles (sheet erosion) and deposits them downstream (sediment deposition or sedimentation).

Many farms have adequate drainage systems which would function properly with adequate outlet channels. Proper drainage would allow farmers to realize increased economic benefits from conservation measures. Some landowners and operators have installed on-farm and group drainage systems with the help of the Acadia and the St. Landry Soil and Water Conservation Districts; however, the entire system of outlets for these smaller systems cannot dispose of the excess water properly.

This watershed, served by an estimated 396 miles of channels, has been identified by the Sponsors as having inadequate drainage and flood problems. These channels are classified according to the type of channel and flow condition. The classifications are shown on the following page.

Type of Channel	Miles
Well-defined natural channel	2
Previously-modified or manmade channel	394
Total	396

Flow Characteristics	
Ephemeral	294
Intermittent	62
Ponded Water	16
Perennial	24
Total	396

Floodwater Damage

Floodwater and drainage problems are inseparable in the agricultural areas. Flooding from storm runoff aggravates and prolongs wet soil conditions in the nearly level terrain, as illustrated by photographs on the following page. Drainage is defined as the removal of excess subsurface or surface water from high water tables or normal precipitation. Flood prevention is defined as the conveyance, control, and disposal of surface water caused by abnormally high direct precipitation or stream overflow. Because of the flatness of the watershed, the wetness of the soil, and the high annual rainfall, water problems are closely interrelated. For instance, an abnormally high rain may occur which saturates the soil. Before soil moisture conditions are reduced sufficiently to allow work, a normal rainfall occurs which again saturates the soil and prolongs the excess moisture problem. Channels in the problem areas are not adequate to prevent frequent, direct damages from floodings or to allow on-farm drainage systems to function properly.

The average annual rainfall is 60 inches. Rainfall of at least 4 inches in 48 hours occurs at a average rate of twice a year, 5.1 inches once a year, and 6.9 inches once in 3 years.

Average annual agricultural damages caused by floods with average recurrence intervals of not more than 3 years are greater than from larger, less frequent floods. Damaging out-of-bank flows occur in portions of the area at an average rate of twice a year. The photographs on the following page show flooding of croplands.

Most of the cultivated land has been in crops for many years. Normal deterioration of channels and increased storm runoff caused by a change in crop rotations from rice-pasture to rice-soybeans has rendered drainage systems inadequate.

Flooding of Crops

Crop Damage Caused by Poor Drainage

Excess water causes delays and difficulties in planting, cultivating, and harvesting that require additional use of equipment and labor. The delays also reduce crop yields and quality.

The estimated average annual "present" yields per acre are 24 bushels of soybeans, 24 barrels of rice, 120 crates of sweet potatoes, 495 pounds of lint cotton, and 40 bushels of corn. Pasture yields range from 40 pounds of beef per acre on rice-rotational pasture to 225 pounds on improved pasture and average 85 pounds.

Rice will be used to illustrate the water problems in the watershed because it is the main cash crop. Research has shown that rice planted in March or April is higher yielding than rice planted in May or June.1/ Therefore, when wet conditions cause long delays in planting, yields are low. When the weather does permit early planting and rain later causes flooding before the rice plants are large enough to tolerate the high water, seedlings population survival is reduced. If the farmer decides not to replant, the thinly-spaced rice produces less than a full stand would produce. The farmer often keeps the existing crop because he runs the risk of having the same problem occur after he replants.

In some areas, floodwaters back into the fields and break irrigation levees. If these levees are not repaired, irrigation to control weeds is impossible. Repair of these levees requires additional labor and other expenses.

Storms and poor drainage at harvest time can affect quality enough to lower prices received. The items significantly affecting the price received for rough rice are head rice and grade.

Head rice includes unbroken kernels and those broken kernels equal to or greater than three quarters of the size of an unbroken kernel. The main reason for the kernels breaking is grain deterioration after maturity. This often happens when large rains occur at the time rice is ready to harvest. Winds during rainstorms cause the rice stalks to lodge and lie in the water, and poor drainage causes the rice to remain wet for long periods. This wetness causes the moisture in the rice to be more than the allowable limit. Therefore, harvest has to be delayed and the rice becomes overripe. Level 1 of head rice, which is equal to or less than 79.9 pounds per barrel, can cause a decrease in price of as much as $0.70 per barrel. Level 5 of head rice, which is equal to or greater than 110 pounds per barrel, can cause an increase in price of as much as $0.55 per barrel.

Factors significantly affecting grade are weed seeds, damage, red rice, and chalk. The grade is usually determined by the factor having the lowest rating. For example, if a lot had three factors

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1/ 58th Annual Progress Report, Rice Experiment Station (Baton Rouge: Agricultural Experiment Station, Louisiana State University, 1966), p. 12.

occurring at level 1 (the best) and one factor occurring at level 3, the rice would be assigned grade 3. The average price difference between the highest operative grade (grade 3) and the lowest operative grade (grade 5) was about $0.12 per barrel. The operative grades are those in which the majority of the rice is classed, mainly the middle grades.

Excessive wetness adversely affects grade. Rice which stays waterlogged in the field is damaged by fungi. Depending on the weather, it may sprout or begin to sour and rot. At other times, it will become chalky.

Levees break from flooding and cause delays in the initial irrigation, thus allowing abnormal weed and red rice infestations. Poor drainage, which prevents or delays cultivations and causes herbicides to be less effective, allows weed infestations in soybeans. The weed seeds and red rice produced in the soybean fields multiply the control problems when these same fields are rotated with rice.

Although most of the soils in the watershed are low in natural fertility, they will produce high-yielding crops and forage if properly drained and fertilized. Farmers are reluctant to invest in higher inputs of production when risks of loss are high.

Other crops, especially cotton, soybeans, and sweet potatoes, are adversely affected by wetness. Prolonged wetness forces farmers to plant late and harvest late. The late harvest is more costly and has lower quality than earlier harvest. Instead of leaving crop residues on the ground or planting cover crops to protect the soil from winter rains, farmers attempt to plow after harvest. This plowing allows early seedbed preparation in the spring. Where good drainage exists, farmers are encouraged to maintain a good soil cover in winter because they usually have ample time for seedbed preparation in the spring.

Flooding causes some roads to be impassable at times, thereby interrupting farming operations and use by local residents. Interruptions and alterations of school bus operations cause delays and school absenteeism to increase. Standing water harbors pests and disease vectors such as mosquitoes. In instances where medical assistance would be required, flooded roads may prevent an individual from receiving timely treatment, resulting in possible loss of life. Photographs on the following page illustrate the flooding problem.

Approximately 3 percent of the Bayou Plaquemine Brule flood plain between Church Point and Crowley is open agricultural land that is flooded more frequently than once in 5 years on the average.

Headwater Flooding in Church Point

Although the capacity of the channel in this vicinity is equal to that which would ordinarily be required for adequate drainage and flood prevention in flatlands, the flooding is damaging to crops in the flood plain. The average width of the well-defined flood plain in this vicinity is about 2,000 feet. The depths of out-of-bank flows are greater than they would be if the flood plain were wider, as it would be in a typical flatland watershed. This flood hazard has probably discouraged farmers from clearing large areas of forest land in the flood plain.

Urban flooding is a problem in Crowley and Church Point. A 100-year flood in Crowley would inundate about 60 percent of the area of the town and damage 270 homes (5 percent). The flooding would result from overflow of local tributaries and would be aggravated by high water stages in Bayou Plaquemine Brule. Several streets, residential yards, and the grounds of a school would be subject to damage. Many of the above mentioned properties would also receive lesser damages in smaller storms. A 100-year flood in Church Point would damage 40 homes, 11 commercial establishments, an industrial complex, a rodeo arena, 30 residential yards, and several streets. The flooding would result from overflow of Bayou Plaquemine Brule. Many of the above mentioned properties also receive lesser damages from smaller storms.

In addition to the direct and indirect monetary damages identified in these two towns, other adverse conditions exist as a result of flooding and poor internal drainage. These include (1) health hazards from water standing in yards and under houses, (2) undesirable odors from stagnated water around dwellings, and (3) wading in water to get to and from dwellings.

A petroleum refining plant near Church Point is subject to flooding. If floodwaters overtop a concrete wall which surrounds the main components of the plant as they would during a 100-year storm, an explosion could occur which would endanger the lives of employees and other persons near the plant.

Flooding and inadequate drainage in both of these towns create adverse environmental conditions that affect both the quality of life and social well-being of the residents.

Average annual floodwater damages are $1,322,700. Of this amount, $983,700 are crop and pasture damages, $14,400 are residential damages, $36,700 are commercial damages, $1,400 are industrial damages, $209,100 are road and bridge damages, and $77,400 are indirect damages. Crop and pasture losses because of impaired drainage total to an amount similar to floodwater damages.

PROBLEMS

Erosion Damage

Sheet erosion, the removal of soil by the impact of raindrops and the flow of runoff, is the main cause of soil loss in the watershed. The rate of sheet erosion depends on the following factors:

1. Amount and intensity of rainfall

2. The cover, or protection, from raindrop impact

3. The physical character of the soil, and

4. The slope of the land and the uninterrupted length of the slope.

Some of the preceding factors do not vary within the watershed. The average amount and intensity of rainfall are similar throughout the watershed. The cover is the same for each land use in the area because the land treatment measures that have been applied are broadly distributed.

Soil and slope vary between the land resource areas. The two major types in the watershed are loess-derive soils (Southern Mississippi Valley Silty Upland) and soils of the prairie (Gulf Coast Prairie). The loessial soils are composed of fine silty particles less susceptible to erosion, and the soils of the prairie are silty clay loams with more erosion susceptibility. The soils in the Gulf Coast Prairie Land Resource Area are soils of the prairie with slopes of approximately 0.5 percent. The soils in the Southern Mississippi Valley Silty Uplands Land Resource Area are loessial soils with slopes of approximately 1 percent. The differences in slopes account for the greater amount of erosion taking place on the loessial soils.

Sheet erosion removes approximately 1,140,397 tons of material each year. This amounts to an average of 4.9 tons of soil per year removed from each acre. Damage to the soils from sheet erosion is low except where slopes exceed 1 percent. Photographs on the following pages show examples of sheet erosion and bank erosion.

Soil losses from gully, streambank, and roadside erosion are in scattered localities and are insignificant when compared to the soil losses from sheet erosion.

Field with excessive sheet erosion

Field protected from excessive sheet erosion by crop residue

Edge effect between cultivated field and rotation pasture

Brushy field border

PROBLEMS

Sediment Damage

Sediment damages on agricultural land are caused by (1) deposition in lower areas of outwash from nearby sheet erosion and (2) deposition by settling out from floodwaters. Reduction of damage from the first cause is accomplished by land treatment and is not normally evaluated in monetary terms.

Damages caused by floodwater deposition are normally assigned a monetary value when the productivity of the soil is affected. The fine-grained sediment derived from the soils of the watershed is deposited as a thin film on flooded lands and vegetation. The resulting damages were grouped with other floodwater damages and were not assigned separate monetary values since they were low.

The primary effect of suspended solids is on quality of water in Bayou Plaquemine Brule and the Mermentau River. As indicated in the graphs in ENVIRONMENTAL SETTING - Physical Resources, samples of water from Bayou Plaquemine Brule had maximums of 320 ppm suspended solids and 510 units of turbidity on the Jackson scale. The samples were taken at three locations on each of three different days in the fall and winter of 1973-74. Water samples taken from the Mermentau River at monthly intervals from 1968 to 1973 had maximums of 290 ppm suspended solids and 300 turbidity units. Estimates of runoff and sediment delivered to the watershed outlet indicate an average suspended solids concentration of 441 ppm. This figure includes, in addition to the colloidal sediment, the larger-sized sediment particles traveling by saltation and the mud flow along channel bottoms. Suspended sediment concentrations will vary widely with (1) season, (2) antecedent moisture, (3) rainfall intensity and duration, and (4) point in time with respect to storm flow. Sediment pollution increases turbidity, which affects the composition of the fisheries in the 24-mile perennial-flow reach of Bayou Plaquemine Brule. As a result, commercial species of fish predominate over game species.

Sediment accumulations develop at some points where sediment concentrations are unusually high and flow velocities decrease drastically in a short distance. Where these deposits are exposed to the air, willow trees grow and reduce channel capacity. The deposits usually occur at points where small, shallow channels enter drainage mains or laterals. Removing the sediment to restore channel capacity adds to the cost of operation and maintenance for the channels and degrades water quality and local aquatic habitats.

PROBLEMS

Irrigation Problems

Rice is the only crop irrigated regularly. Pasture, soybeans, and other crops may be irrigated occasionally. About half the water used for rice irrigation is ground water from the Chicot Aquifer; the other half is drawn from surface waters, especially Bayou Plaquemine Brule and Bayou Wikoff. Surface water supplies include water released from ricefields upstream. The amount of water used in Acadia and St. Landry Parishes is shown in the following tabulation.2/

Parish	Water Used for Rice Irrigation in 1969 ----million gallons per day---- Ground Water	Surface Water	Total
Acadia	149.77	131.06	280.83
St. Landry	33.54	7	40.54

The water level of the Chicot Aquifer under the watershed was 15 to 20 feet above sea level in 1903.3/ In 1950, it was 0 to 5 feet below sea level;4/ in 1960, it was 15 to 20 feet below sea level.5/ The average rate of decline of the water level was 1.5 feet per year.6/ The decline was caused mainly by irrigation pumpage in the area. Industrial and municipal pumpage in the Lake Charles area had some influence on the decline.

2/ State of Louisiana, Department of Conservation, Pumpage of Water in Louisiana, Water Resources Pamphlet No. 26 (Baton Rouge: Louisiana Geological Survey and Louisiana Department of Public Works, 1970), pp. 8-9.

3/ Paul H. Jones, A. N. Turcan, Jr., and Herbert E. Skibitzke, Geology and Ground Water Resources of Southwestern Louisiana, Geological Bulletin No. 30 (Baton Rouge: Louisiana Geological Survey, 1954), Plate 17.

4/ Ibid., Plate 29.

5/ Alfred H. Hardner, Water Levels and Water-Level Contour Maps for Southwestern Louisiana 1959 and Spring 1960, Water Resource Pamphlet No. 10 (Baton Rouge: Louisiana Geological Survey and Louisiana Department of Public Works), Plate 3.

6/ Allen L. Zack, Ground Water Pumpage and Related Effects, Southwestern Louisiana, 1970 With a Section of Surface Water Withdrawals, Water Resources Pamphlet No. 27 (Baton Rouge: Louisiana Geological Survey and Louisiana Department of Public Works, 1971), Plate 3.

PROBLEMS

Projected requirements for the year 2020 are probably near the maximum which can be supplied from the aquifer. Local problems, such as supplying peak irrigation requirements, will probably develop after the year 2000.7/

The soils are well-suited for rice irrigation because of the slow permeability of the subsoil. Subsurface pipelines are beginning to replace open canals in irrigation systems where water losses and associated pumping costs are critical. The following tabulation compares pertinent cost items for surface and subsurface transmission on farms in southwest Louisiana.

Item	Units	Average Annual Per Farm Surface	Average Annual Per Farm Subsurface
Investment	Dollars/ft	0.59	3.84
Hand Labor	Hours	88.2	18.0
Machinery and Equipment Maintenance	Dollars	301.36	0
Weed and Grass Control Materials	Dollars	30.40	0
Water Losses	Pumping Hours	166.1	0
Area Returned to Production	Acres	0	3.4
Cost of Closing Surface Canals	Dollars	0	1,096.47
Pumping Time	Hours/acre	7.6	6.4

Source: Willard F. Woolf and Joseph W. Freeland, Cost of Surface Canal Versus Subsurface Pipeline Irrigation Southwest Louisiana Rice Area, D.A.E. Research Report No. 460 (Baton Rouge: Louisiana State University, Department of Agricultural Economics and Agribusiness, 1973), pp. 7-12.

Subsurface pipelines will probably be adopted only in certain situations. Pumpage costs, which are related to the source of water, are an important factor which could influence decisions on systems. Pumping ground water into a delivery system costs more than pumping surface water. Long-term costs of subsurface pipelines should be

7/ State of Louisiana, Department of Public Works, Ground Water Resources and Requirements for Louisiana 1970-2020, Comprehensive Water and Related Land Resources Study, Series II, Volume II (Baton Rouge: Department of Public Works, 1971), p. 97.

less than the costs of surface canals when ground water is the source. This is true, for example, when the pipelines have an expected life of 50 years, reorganization of surface canals is scheduled for 15 years, and 7 percent interest is compounded annually on investments. Long-term costs of surface canals would be less under these conditions when surface water is the source.

Another factor which affects decisions on irrigation systems is land tenure. Since operators generally contribute all labor and all or part of the materials to maintain surface canal systems, landowners not farming the land will probably be reluctant to make investments in pipelines.[8] Subsurface pipelines, which would reduce the amount of irrigation water used about 15 percent, are expected to be installed on 25 to 50 percent of the land during the installation period.

Municipal and Industrial Problems

All municipal water is obtained from the Chicot Aquifer. The water is high in total dissolved solids and iron and is relatively hard, but the quality is acceptable. The wells provide an adequate amount of water, and the reservoir will support additional wells. A declining water level is causing an increase in costs of pumping from the aquifer, but an adequate supply exists for the foreseeable future.

Recreation Problems

The estimated 1974 population within a 30-mile radius of the watershed is 343,000. By the year 2020, it is expected to be 473,400, a 38 percent increase. The recreational demands based on the present population are 1,992 tent camping sites, 1,349 trailer camping sites, 2,476 picnicking sites, and 554 boat launching ramps. Subtracting the present supply from present demands indicates a remaining need for 1,992 tent camping sites, 1,239 trailer camping sites, 2,168 picnicking sites, and 492 boat launching ramps.

The area is below average in the quality and quantity of water available for fishing and water sports. The Mermentau River is the only substantial water-based recreation resource near the area. Within 50 miles, however, numerous resources and facilities for water-based recreation are available. These resources include Grand Lake, White Lake, Lake Arthur, Lake Fausse Point, Cocodrie Lake, Chicot Lake, Henderson Lake, and others.

8/ Willard F. Woolf and Joseph W. Freeland, Cost of Surface Canal Versus Subsurface Pipeline Irrigation Southwest Louisiana Rice Area, D.A.E. Research Report No. 460 (Baton Rouge: Louisiana State University, Department of Agriculture Economics and Agribusiness, 1973), pp. 7-12.

Local interest exists for developing recreational facilities. However, investigations indicate little opportunity exists for developing quality water-related recreational facilities on a scale that would adequately serve public needs.

Plant and Animal Resource Problems

The watershed lands support good populations of open land wildlife, especially dove, snipe, killdeer, and waterfowl. Most open land wildlife species are near the present carrying capacity of the existing habitat. Major factors limiting population are (1) lack of protective cover, especially in the winter, (2) lack of suitable nesting habitat, (3) available year-round food supply, and probably (4) increased usage of pesticides. Clearing brush and weeds from fence lines, ditches, levees, and other areas not in crop production has aggravated the problem of insufficient protective cover. Pastureland that is being overgrazed and under-fertilized is providing rather poor habitat for open land wildlife with the possible exception of mourning dove. Photographs on the following page illustrate lack of cover in overgrazed pasture and good cover in lightly grazed pasture.

The volume of agricultural chemicals applied has increased. Increases in volumes usually lead to increases in the amount of pesticides in the natural environment. Pesticide volumes do not inevitably reflect the amount of actual hazard to wildlife, but they do reflect potential hazard. Real danger depends upon a number of complex, variable, and interrelated relationships between the organisms present, environmental factors, and treatment procedures. The effects of each chemical must be evaluated in terms of (1) type and nature of chemical used and its rate and method of application; (2) species, age, sex, and behavioral patterns of animals present; (3) effects of food chain and habitat; and (4) the climate, season, and local weather conditions.

Of the many insecticides now being used and occurring in ecosystems, the following are considered more important in their effects on fish and wildlife.[9/]

1. DDT and its metabolites
2. Dieldrin
3. Endrin
4. Heptachlor
5. Benzene hexachloride
6. Lindane
7. Chlordane
8. Toxaphene

9/ R. E. Johnson, T. L. Carver, and E. H. Dustman, "Residues in Fish, Wildlife, and Estuaries," Pesticides Monitoring Journal, Vol. 1, No. 1 (June 1967), p. 13.

Heavily grazed pasture (poor open land habitat)

Lightly grazed rice-rotation pasture (good open land habitat)

PROBLEMS

Prior to 1968 endrin was used extensively in southern Louisiana, but since that time its use has been sharply curtailed upon the recommendation of the Louisiana State Department of Agriculture. The major herbicides used in the area are (1) propanil, (2) lasso, (3) ordram, (4) silvex, and (5) 2,4-D.10/

Agricultural practices such as spraying insecticides and herbicides have adverse effects on aquatic environments. Of all the major pollution-caused fish kills in Louisiana during 1967, 51 percent were related to agricultural operations, 34 percent were related to industrial operations, and 15 percent were caused by municipal operations.11/

The Soil Conservation Service, in cooperation with the Louisiana Agricultural Experiment Station, Environmental Section of the Louisiana Wild Life and Fisheries Commission, and the U.S. Fish and Wildlife Service have set up a pesticide, fish population, and water quality monitoring program of the bayous and channels within the watershed. This program is designed to determine the extent and type of pesticide residue contamination now present and monitor any increases, decreases, or changes in types of pesticides. It will also monitor any changes in major water quality parameters (ammonia, color, turbidity, nitrate, oxygen, phosphate, suspended solids) which affect fish and wildlife. With this information, it will be possible to better evaluate the effects of pesticide residues on fish and wildlife. Thus, it will be possible to more accurately recommend treatment measures and agricultural practices that will prevent, lessen, or eliminate problems which may occur because of their improper or unwise use. Also, it will be easier to predict a problem developing from pesticide use or changes in water quality parameters and take corrective action before any actual damage to fish and wildlife occurs.

This monitoring program has been in operation since May 15, 1973 and is scheduled to last 7 years. The results of the first year of pesticide residue monitoring are given in the tabulation on the following page.

The Soil Conservation Service is monitoring changes in the types and usage of pesticides within the watershed in addition to monitoring pesticide residues in the local aquatic environment. As necessary, the Soil Conservation Service will run a survey of the local farmers and flying services to determine the current (1) types of pesticides

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10/ D. R. Rowe *et al.*, "Dieldrin and Endrin Concentrations in a Louisiana Estuary," *Pesticides Monitoring Journal*, Vol. 4, No. 4 (March, 1971), p. 178.

11/ "Pollution Caused Fish Kills - 1967," *8th Annual Report*, Federal Water Pollution Control Administration, p. 13.

PESTICIDE RESIDUE CONCENTRATIONS
Bayou Plaquemine Brule Watershed[a]
1973

	BHC Alpha (ppm)	P, P′-DDD (ppm)	P, P′-DDE (ppm)	P, P′-DDT (ppm)	Dieldrin (ppm)	Toxaphene (ppm)
STATION NO. 1[b]						
Fish[e]						
Bluegill	0.02	0.07	0.12	0.06	0.17	0.38
Crappie	.01	.05-.17	.04-.16	.04-.17	.07-.16	.27-1.66
Sediment	f/	0.07	0.02	g/	g/	f/
Water	f/	f/	f/	f/	f/	f/
STATION NO. 2[c]						
Fish[e]						
Bluegill	g/	0.05	0.05	0.07	0.04	g/
Gizzard Shad	g/	.04	.11	.07	.04	0.30
Sediment	f/	0.08	0.03	0.01	0.01	f/
Water	f/	f/	f/	f/	f/	f/
STATION NO. 3[d]						
Fish[e]						
Gar	0.02	1.19	0.74	0.76	0.57	4.20
Sediment	f/	0.04	0.01	0.08	0.01	f/
Water	f/	f/	f/	f/	f/	f/

a/ Samples collected by Soil Conservation Service biologist; analysis performed by Feed and Fertilizer Laboratory, Louisiana Agricultural Experiment Station-Louisiana State University, Baton Rouge.

b/ Bayou Plaquemine Brule at Quebodaux Ferry, west of Crowley.

c/ Bayou Plaquemine Brule at Highway 13 Bridge, north of Crowley.

d/ Bayou Plaquemine Brule at Highway 367 Bridge, northwest of Rayne.

e/ Fish were dressed and skinned.

f/ No results received.

g/ No chlorinated hydrocarbons detected at 0.01 ppm.

being used, (2) rate of application for each pesticide, (3) number of applications per year per pesticide, (4) number of acres treated with each pesticide, (5) method of application, and (6) total amount of each pesticide applied. This information has been obtained for 1973 and is presented in the tabulation on the following page.

Major problems affecting the fisheries of the watershed are (1) poor water quality, (2) limited quantity of water suitable to sustain a productive fishery, (3) lack and difficulty of proper management, and (4) rather poor access (launching and parking facilities) to the existing water areas.

Poor water quality is the major problem limiting the quantity (pounds of fish per acre) and quality (size and species of fishes present) of the fisheries. Because of poor water quality, the sport fishery (bass, bream, crappie) is low and the commercial fishery (catfish, buffalo, gar, freshwater, drum, carp) is only moderate. This poor water quality is caused by high concentrations of suspended solids and plant macro-nutrients, high color and turbidity, and probably contamination by pesticides. The capacity of channel systems to absorb and diffuse contaminants in water has been lessened by past modification of the channels. High values for the above parameters favor a change in the species of fishes present. This species composition change is usually from the more desirable sport fishes to the less desirable commercial or "rough" fishes. This change in fish species composition is a major problem limiting the sport fishery in Bayou Plaquemine Brule and its major tributaries. Refer to the discussion and tabulation of fish population samples found in the <u>ENVIRONMENTAL SETTING - Plant and Animal Resources</u>.

Poor water quality is detrimental in other ways. Organic pollution reduces or eliminates the water's value for activities such as swimming and water-skiing. Water with visible pollution such as turbidity is not aesthetically pleasing to most people. An increase in the quality of the existing water resource should cause an increase in the quality of the fisheries. Also, improving water quality would increase its value for recreation.

Pollution from oil drilling, production, and transportation was a major problem affecting water quality during the late fifties and early sixties. However, because of modern control techniques and more rigid enforcement of anti-pollution laws, oil-related pollution is now only a minor problem in the area. It could become a major problem again if control measures were lessened.

Pesticide Usage Survey of
Bayou Plaquemine Brule Watershed[a]
1973

PESTICIDE	Application rate/acre[b]	Acres receiving application[c]	Percent of farms using listed pesticide[d]	Total volume applied
FUNGICIDES				
Captan	3½ lbs/ac	5,800	72	20,300 lbs
HERBICIDES[e]				
Alachlor	3 qts/ac	3,495	48	2,620 gals
Fluometuron	2-8 lbs/ac	330	3	9,240 lbs
Linuron	1 lb/ac	1,375	21	1,375 lbs
Molinate	30 lbs/ac	1,160	33	34,800 lbs
MSMA	1-2 lbs/ac	330	3	495 lbs
Nitralin	4 qts/ac	300	9	300 gals
Propanil	4 qts/ac	3,180	51	3,180 gals
Propanil and Molinate (mixed)	3 qts/ac (each)	90	9	330 gals
Trifluralin	1 lb/ac	450	15	450 lbs
2,4-D	1 qt/ac	420	15	105 gals
2,4-DB	2 lbs/ac	100	3	200 lbs
INSECTICIDES[f]				
Aldrin[g]	3½ lbs/ac	5,890	72	20,615 lbs
Carbaryl	1½ lbs/ac	310	6	470 lbs
Carbofuran	17 lbs/ac	755	15	12,835 lbs
Methyl Parathion	1 qt/ac	1,225	21	305 gals
Toxaphene[g]	1 lb/ac	260	3	260 lbs

a/ Data prepared by District Conservationist from a survey of 33 farms, comprising a representative sample of 10 percent of the land area.

b/ Application rates based on average rates used by four local flying services.

c/ No pesticides were used on 7,285 acres; one or more pesticides were used on 12,885 acres.

d/ No pesticides were used on 12 percent of farms surveyed.

e/ Most herbicides are applied only once per crop season.

f/ Number of applications varies, depending upon degree of infestation during crop season.

g/ Denotes chlorinated hydrocarbons.

The farm ponds are difficult to properly manage for sport fish production because most of them are the "dug-out" type, which usually have no means of water control except pumping out. Standing crop of the fish in these ponds could be increased 50 to 75 percent by improved management. This could be accomplished by restocking, fertilizing, and adequate harvesting. Because of the nearly level topography and intensive land use, the potential for new impoundment to provide additional fish habitat is limited.

Quality of fishery and recreation resources in the watershed is adversely affected by the practice of dumping trash and garbage into the channels at road crossings. This practice, which is increasing as the population increases and becomes more mobile and affluent, creates health hazards, increases water pollution, lowers water quality, detracts from the natural beauty of waterways, and is detrimental to the fishery and recreational resources. Lack of a convenient and efficient solid waste disposal system and public awareness of detrimental effects are the major causes of this problem. Photographs on the following page illustrate effects of littering and bank erosion on the aesthetics and water quality.

Existing public roads provide adequate access to most permanent water areas. However, improved boat launching facilities and parking areas are needed in order to obtain optimum use of the fisheries. A number of existing launching facilities are at good locations, but they need to be more fully developed.

Forest wildlife species include white-tailed deer, rabbits, woodcock, wood duck, squirrels, raccoon, most species of furbearers, and many nongame species. The major problem affecting forest wildlife populations is the limited amount of suitable habitat. Only 11 percent, or 25,100 acres, of the land area is forest land habitat. However, most of the forest land is the bottom land hardwood type which has a high, productive potential for wildlife. The remainder of the forest land is the oak-pine forest type, which normally has a moderate, productive potential. However, this forest type is important to forest wildlife as temporary habitat during periods when the bottom land hardwoods are flooded. The fact that only a relatively small amount of this forest-type remains adds to its importance as forest wildlife habitat. About 48 percent of the forest land is Type 1 wetlands which are extremely valuable to most species of forest wildlife as explained in <u>ENVIRONMENTAL SETTING - Plant and Animal Resources</u>. The potentially high productivity and relatively small quantity of existing forest land increases the significance of additional losses. However, only 1,700 acres of forest land were

Litter in Channel

Moderate Bank Erosion

cleared in all of Acadia Parish from 1962 to 1971, which indicates that decreases in forest land will be only a minor problem.

White-tailed deer populations are restricted because of the configuration and relatively small amount of forest land. Wild turkey populations would be affected in a similar manner. Under normal hunting and habitat conditions, turkey require large tracts of forest land in order to maintain large populations. Deer can be maintained on smaller and more dispersed forested acreages. All the significant forest habitat is along the narrow flood plains of Bayou Plaquemine Brule and some of its tributaries. This habitat averages one-quarter mile wide on each side of the bayou, which is near the minimum width necessary to sustain significant deer or turkey populations. However, further reduction in present widths, except for the 90 acres required for project installation, is not anticipated.

In the past, little if any, timber management or improvement was performed. This is especially true in the bottom land hardwood areas which have been "high graded" for a long time. This practice is detrimental to full timber production and large, healthy forest wildlife populations. It consists of removing higher quality trees and leaving the lower quality trees to produce new timber and wildlife foods. Also, "high grading" often causes a plant species composition change because some timber species are more desirable than others. Forest lands which are properly managed for sustained timber production generally will have more populous, more desirable, and more varied forest wildlife species than poorly managed lands. In view of the lack of interest for forest management on the landowner's part, this resource probably will not be upgraded without combining ownerships.

Road access to the forested areas is generally adequate for hunting and other activities related to forest resources. A possible exception to this is in the vicinity of the watershed outlet at the junction of Bayou Plaquemine Brule and Bayou des Cannes. Posting is limiting access to forest land areas. The amount of posting is expected to increase rapidly.12/ Landowners are now strongly motivated to reserve areas for hunting and other forest-related recreation. This attitude is a result of increased competition among hunters and abuses of property and resources by visiting "sportsmen." Private hunting clubs lease hunting rights from some

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12/ Louisiana Wetlands Prospectus (Louisiana Advisory Commission on Coastal and Marine Resources, 1973), p. 255.

landowners and post the land to insure hunting opportunities for club members. If the anticipated posting does occur, many local citizens who do not own land and cannot join a hunting club will be deprived of ready access to forest land for hunting, nature study, and other outdoor recreation.

In addition to providing essential habitat to forest land wildlife species, the remaining forest is helpful in preventing further degradation of surface water quality. This, in turn, affects fish, wildlife, and recreational activities in varying degrees.

The forest land and its associated wetland areas act as cleansing agents to help remove pollutants from the water. This is accomplished directly by filtering and absorbing them or indirectly by reducing the water's velocity which causes it to drop part of its suspended solids and their associated pollutants.13/

Forest vegetation along channels provides shade, which is essential for a desirable natural aquatic ecosystem. Shade moderates day to night temperature extremes and lowers average annual water temperature.14/ However, excessive shade, especially in ponded water, can prevent the achievement of maximum photosynthesis by the green aquatic plants. "It is estimated that 25 to 50 percent of full sunlight is necessary for many green aquatic plants to reach maximum photosynthesis."15/

Water Quality Problems

There are a number of problems affecting water quality in the project area. Major problems are excessive turbidity and suspended solids, increased sedimentation, contamination from harmful or toxic substances such as sodium, chloride, pesticides, and plant macro-nutrients, and deterioration of scenic quality through improper use and development of the land-water resource.

13/ Ruth Patrick, "The Effects of Channelization on the Aquatic Life of Streams," (The Academy of Natural Sciences of Philadelphia), p. 2.

14/ Ibid., p. 6.

15/ U.S. Department of the Interior, Federal Water Pollution Control Administration, Report of the Committee on Water Quality Criteria, 1968, p. 48.

Excessive concentrations of suspended solids and its associated high turbidity, color, and rate of sedimentation are the major problems affecting water quality in the watershed. Average readings of 142 mg/l suspended solids, 732 units of color (apparent), and 268 FTU's of turbidity were recorded for Bayou Plaquemine Brule and its major tributaries. Refer to Water Quality Data in ENVIRONMENTAL SETTING on page 41. High values for these parameters have many adverse effects on water quality and the aquatic ecosystems, i.e., filling in lakes and channel "pot holes," reducing primary biological productivity, lowering the aesthetic value of the water and carrying pesticides, plant macro-nutrients and other contaminants into the aquatic environment. For a more detailed description of their effects on water quality and aquatic life, refer to the discussion on these parameters in appendix D.

Eutrophication is not a major problem at present. Nutrients primarily responsible for eutrophication are nitrogen and phosphorus. These have an average concentration in Bayou Plaquemine Brule and its tributaries of 1.85 mg/l N (ammonia and nitrate) and 1.24 mg/l PO_4 (orthophosphate). These concentrations are above those needed to promote accelerated rates of eutrophication. The major factors preventing high rates of eutrophication are high turbidities and suspended solid loads. These two water quality parameters are suppressing eutrophication by preventing the aquatic plants from fully utilizing the available plant macro-nutrients. See appendix D.

Diffuse sources of pollution are the largest problem to water quality in the area because they are difficult to locate and treat. Diffuse sources are widespread, low concentration sources such as agricultural runoff, septic tank effluents, drainage from wetlands, and recycling of nutrients from bottom sediments. The cumulative effect of these different diffuse sources are having a detrimental effect on some water quality parameters such as nitrogen, phosphorus, suspended solids, turbidity, and pesticide residue concentrations.

Other problems affecting water quality in the watershed are contamination by pesticides, littering, and bank erosion. Refer to tabulation, "Pesticide Residue Concentrations," page 73 and photographs on page 77.

Economic and Social Problems

The level of income necessary for surviving on a minimum diet with none of the amenities of prosperity has been determined by the

Social Security Administration.16/ An individual is considered poor if his personal income or the income of his family inadequately provides for his subsistence. In 1960, by this definition, 46 percent and 56 percent of all the families in Acadia and St. Landry Parishes, respectively, were classified as poor. In 1966, 37 and 44 percent were classified as poor in these same parishes. This was an improvement of approximately 9 and 12 percent since 1960. However, 87 and 95 percent of all the counties in the United States still had a smaller proportion of poor families. One and two percent of all the families in Louisiana live in Acadia and St. Landry Parishes, respectively. However, 2 percent and 3 percent of all the poor families in the State reside in these parishes.

According to the 1970 census for Acadia and St. Landry Parishes, 31,494 families lived in the two parishes and had a median income of $5,174. Of the total families, 14,680 were urban with a median income of $5,595, 12,254 were rural non-farm with a median income of $4,847, and 4,560 were rural farm with a median income of $4,677. About 31 percent of the urban families had incomes less than the poverty level while 40 percent of the rural nonfarm and 59 percent of the rural farm families had incomes less than the poverty level.

Most of Acadia and St. Landry Parishes' economic conditions are below the State average. Compared with State averages, Acadia and St. Landry Parishes have 19 percent and 21 percent, respectively, more primary individuals who are 65 years of age and over, 2 percent and 49 percent more occupied households which average 1.51 or more persons per room, and 6 percent and 116 percent more occupied households lacking complete plumbing facilities.17/

Old age assistance and aid to dependent children are the two largest recipient groups of welfare aid in Acadia and St. Landry Parishes. Of the total public welfare assistance grants made in fiscal year 1968-69 in these parishes, 60 percent were for old age assistance, 24 percent were for aid to dependent children, 12 percent were for disability assistance, 2 percent were for general assistance, and 2 percent were for aid to the needy blind. About 43 percent of the parishes' population were under 18 years old and 9 percent were 65

16/ James R. Robo and Dean A. Dudley, Statistical Abstract of Louisiana, 4th ed. (New Orleans: Division of Business and Economic Research, College of Business Administration, Louisiana State University at New Orleans, 1971), p. 172.

17/ Fred M. Wrighton and Barbara H. Denton, "Population and Housing Correlates of Poverty in Louisiana, 1970," The Louisiana Economy (Ruston: College of Business Administration, Division of Business and Economic Research, Louisiana Tech University, 1971), Vol. IV, No. 2 (May 1972), pp. 2-5.

years old and over.[18] Information from the 1970 census reveals that 12 percent of the people over 25 years old had never completed 1 year of school and 18 percent were high school graduates. The median for years of school completed was 8. The preceding statistics for the two parishes are considered to be representative of the watershed.

A trend of increasing farm sizes and decreasing number is continuing in the watershed. According to 1969 Census of Agriculture data, Acadia and St. Landry Parishes had 4,317 farms or 28 percent less than in 1964. The average farm sizes in Acadia and St. Landry Parishes increased from 176 and 83 acres, respectively, in 1964 to 231 and 117 acres in 1969. Increased production costs and relatively static prices for farm products until 1973 have caused decreased net returns per acre. Small operators have either been forced to (1) quit farming, (2) expand their acreages, or (3) supplement their incomes with other work. Many of the small farmers have either sold or rented their land. The majority of the remaining small farmers are employed off the farm and are not primarily dependent on the farm for their livelihood. According to the 1969 Census of Agriculture data for the combined parishes of Acadia and St. Landry, about 57 percent of the farms had sales of less than $2,500, 71 percent had sales of less than $5,000, and 79 percent had sales of less than $10,000.

The trend of decreasing number of farms and increasing size is expected to continue in the future. Farmers are trying to raise their income by farming more land. In order to accomplish this, they have to use larger, more expensive labor-saving equipment.

The population of Acadia Parish increased 2,178 and the population of St. Landry Parish decreased 1,129 from 1960 to 1970. The net out-migration was 6,267 and 15,131 persons, respectively, for Acadia and St. Landry Parishes. This was an 11 and 16 percent decrease in the expected 1970 population. The expected 1970 population was calculated by adding births from 1960 to 1970 to the 1960 population and subtracting deaths which occurred during that same time.[19]

Many of the young adults are leaving the farm to seek employment elsewhere. Increased efficiency of remaining labor through greater mechanization is necessary for survival of the family-type farm.

18/ Robo, op. cit., p. 79.

19/ Roger L. Burford and Sylvia G. Murzyn, Population Projections by Age, Race, and Sex for Louisiana and Its Parishes 1970-1985, Occasional Paper No. 10 (Baton Rouge: Division of Research, College of Business Administration, Louisiana State University, 1972).

Other Problems

Watershed residents obtain water for human consumption from wells; they obtain water for livestock from channels, ponds, and wells. These sources are adequate except for the shallow wells which are sometimes affected by drawdown of irrigation wells.

ENVIRONMENTAL IMPACTS

Conservation Land Treatment

The installation of land treatment measures will improve soil cover and surface drainage. Measures such as conservation cropping systems, crop residue management, structures for water control, and pasture and hayland planting and management will reduce erosion.

Installation of measures such as drainage land grading, land smoothing for drainage and irrigation, and structures for water control will help alleviate the wetness problems and reduce erosion in the watershed. The effects of these land treatment practices and structural measures are inseparable and are discussed in the Structural Measures section.

The reduction in erosion will also reduce the resulting sedimentation and turbidity. Sheet erosion over the project area will be reduced from 4.9 tons per acre per year to 4.4 tons per acre per year. This reduction in sheet erosion, as a result of land treatment measures, will result in an 8-percent reduction in sediment.

Structural Measures

Flood Prevention and Drainage - The installation of the combined program of land treatment and structural measures will directly benefit about 111,600 acres of cropland and pastureland. The remaining 74,900 acres of cropland and pastureland will not be affected by project channel work. Although benefits were not calculated on these acres, they will benefit from the accelerated installation of land treatment measures and by rotational systems allowable because of project effects in the benefited areas.

The area directly benefited consists of 34,100 acres of rice, 51,600 acres of soybeans, 400 acres of cotton, 4,500 acres of corn, 5,800 acres of sweet potatoes, 10,600 acres of rice-rotational pasture, and 4,600 acres of permanent pasture. The acres shown in the benefited area differ from those in the problem areas because of rights-of-way requirements and shifts in land use. Average annual yields per acre will increase 5 percent for rice, 17 percent for soybeans, 29 percent for cotton, 33 percent for corn, 8 percent for sweet potatoes, and 19 percent for pasture.

Land in forest should remain in forest, since only minor areas of forest are to be traversed or affected by project channels and these channels were not designed to protect forested areas. If forested areas were cleared for agricultural production, the wetness problem generally would be more severe than that which is presently on the cropland and pastureland.

The project will accelerate the establishment of conservation practices and increase the effectiveness of those already on the land. These practices will protect the agricultural resources of the area and improve the environment. Landowners and operators will construct and maintain adequate on-farm and group drainage facilities in order that project benefits will accrue.

An estimated 480 farmers will directly benefit from the installation of project measures and land treatment. An additional 40 farmers will benefit from accelerated land treatment only. These measures will provide benefits for 2,100 farm-family members and farm employees. Other persons dependent on farm trade will also benefit. Benefits will accrue from the financial and technical assistance made available for the installation of the project. This will bring outside monetary resources into the community and will provide an opportunity to use goods, services, and labor from the local area. The use of unemployed or underemployed local labor will be needed during project installation and throughout project life for normal operation and maintenance.

Future land use that will be affected by project construction is discussed under PLANNED PROJECT.

Floodwater and drainage effects other than for Channel M-1 are discussed together because the problems are inseparable. Channels which remove floodwater also remove drainage water.

The flood prevention and drainage channels will reduce the high risks involved in farming and make it a more profitable business enterprise. Farmers will be able to improve the quality and yields of their crops by (1) improving soil conditions, (2) planting earlier, (3) effectively controlling weeds and grasses, and (4) harvesting at favorable times.

Improved drainage will allow proper timing of cultural practices. Both planting and harvesting can be done efficiently at opportune dates. Large equipment can be used on the more level, better-drained fields. Timely planting will increase plant populations and extend the growing period, thereby allowing efficient use of equipment and other factors of production. Improved drainage and flood protection will reduce the frequency of replantings and cultivations, and will allow effective application of land treatment measures. This will promote crop residue management, reduce fall plowing, and permit better rotations of crops in the problem areas. In turn, these practices will conserve soil fertility, reduce average sheet erosion by 8 percent, improve wildlife habitat, and help control weed growth.

Project measures will provide protection to agricultural land in the benefit area from a rainstorm which is expected to occur, on the average, once every 3 years. Runoff rates from the 3-year storm

will exceed channel capacities, but the flooding duration will not exceed 24 hours. Flooding for this duration will not cause significant damages to crops and pastures. Larger storms will cause significant damages, but the damages will be less than they would be with present conditions.

Pasture grasses will grow faster and provide better, more desirable forage. Unpalatable, water tolerant weeds would not thrive. As a result, stocking rates for livestock would increase and the pastureland would be used nearer to its potential.

Improved farming efficiency resulting from project installation will reduce the annual cost of production about $386,900. Reduced flooding, improved soil conditions, and better, more timely management practices will improve the quality of products marketed. The additional average annual income received due to improved quality will be 1 percent or $143,900.

Agricultural fertilizer uses will increase because of the project. Estimates of fertilizer use in the future show an increase of about 7 percent or 760 tons annually. This amount will be less if current research proves successful. This research deals with the time release of nutrients such as inorganic nitrogen which do not remain in the soil for long periods of time. Under continuous cropping, soil fertility would decline without further use of fertilizer. The use of fertilizers now accounts for approximately one-third the production of our total food supply.1/

The estimated reduction in agricultural flood damages brought about by the 3-year level of protection is 71 percent. Average annual crop and pasture damages from flooding will be reduced from $983,700 to $280,800. In addition, farmers will be able to install on-farm drainage measures resulting in $702,900 annually in benefits due to adequate drainage. Benefits resulting from more intensive use of cropland will amount to an average of $156,100 annually. These benefits reflect increases in yields resulting from increases in efficiency of farming operations and increases in production inputs.

Urban flood damages in Church Point will be minimized by enlarging about 3 miles of Bayou Plaquemine Brule. The channel work will prevent significant damages of homes and commercial buildings from the runoff of a 100-year storm. Frequency of damage to streets, bridges, yards

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1/ U.S. Department of Agriculture, Soil Conservation Service, "Water Pollution from Agriculture," Missouri's All Employees Training Conference - Framework for the Future (Unpublished compilation of speeches and training sessions made at the training conference, 1972), pp. 42-51.

and other improvements, as well as nuisance and health problems caused by flooding will be reduced.

Peak stages will be increased in channels downstream from modified channel reaches. The stage increases at selected points are shown in the following tabulation.

Stream and Station	Increase Stage - Feet 3-yr.	10-yr.	100-yr.
Bayou Plaquemine Brule (M-1)			
2240+00	0.1	0.1	0.1
1950+00	0.2	0.2	0.3
1665+69	0.2	0.2	0.2
1280+00	0.2	0.2	0.3
839+60	0.1	0.2	0.2
624+16a/	0.1	0.1	0.2
435+00	0.2	0.1	0.1
0+00	0.1	.05	.05
Bayou Wikoff (L-1I)			
560+00	.05	0.1	.05
Bayou Blanc			
287+00a/	0.1	0	0
Mermentau River near Mermentaub/	0	0	0

a/ Near Crowley
b/ Combined effect of all existing and proposed Public Law 566 watershed projects upstream from this point.

Under present conditions, a storm of 1-percent chance occurrence (100-year frequency) will produce a peak stage on Bayou Plaquemine Brule in Church Point at Louisiana Highway 95 of approximately 45.8 feet mean sea level (m.s.l.). With project measures installed, the 100-year peak will be about 43.6 feet m.s.1 or 2.2 feet lower.

The tabulation on the following page compares the estimated damages which would occur without and with the project measure at Church Point during the passage of a storm of 4-percent chance occurrence (25-year frequency) and a storm of 1-percent chance occurrence (100-year frequency).

Type of Damage	25-Year Storm: Without Project	25-Year Storm: With Project	100-Year Storm: Without Project	100-Year Storm: With Project
	dollars			
Residential	15,000	700	49,300	2,400
Commercial & Industrial	20,000	-0-	48,000	9,400
TOTAL	35,000	700	97,300	11,800
Reduction in Damages		98%		88%

The project will reduce damages significantly in 40 residences, 11 commercial properties, and an industrial complex. Damages to yards on another 30 residences will also be reduced in addition to damages to roads and bridges. Urban damages exclusive of roads and bridges will be reduced 84 percent ($49,700 to $7,900).

While residential damages from flooding cannot be completely eliminated for storms larger than a 10-percent chance occurrence, reductions in these damages from the storm that occurs once in 25 years amounts to 95 percent, and the reduction in damages from a 100-year storm would amount to 95 percent. The remaining urban damages under project conditions will be to one house, a camp building, and numerous yards.

Commercial and industrial damages will be reduced an estimated 80 percent. Remaining commercial and industrial damages will consist of cleanup costs and losses in value of equipment and supplies.

Road and bridge damages will be reduced an estimated 70 percent ($145,900 annually). Due to the decreased depth of flooding of roads with the project installed, chance of the loss of human life by drowning will be reduced.

Following project installation, the highway bridges over Bayou Plaquemine Brule at Church Point will be protected to an extent that traffic may continue uninterrupted during the passage of a 100-year storm. This will eliminate the inconvenience to schools and the hazards of people being separated from fire and police protection and medical aid.

IMPACTS

The capacity of the natural drainageway of Bayou Plaquemine Brule (M-1) downstream from Church Point must be maintained for a distance of approximately 8 miles. This point is located approximately 1 mile downstream from Louisiana Highway 365. This will assure that the section near Church Point that will be enlarged will function as designed. The Sponsoring Local Organization will prevent to the extent possible, development in this area. They will monitor the designs of future construction and landfills in the drainageway to assure that adequate flow capacity is maintained.

The extent of urban flood protection for Church Point is from approximately 2 miles above to 1 mile below the town limits (figure 7). In order to prevent the local citizenry from assuming a false sense of security from the planned measure, the Sponsors will publicize, at least annually the nature and extent of flood hazards remaining in those areas subject to flooding by the 100-year storm.

This project does not provide urban flood protection to areas in the town of Crowley subject to the 100-year storm. The channels shown on the project map in the vicinity of Crowley are designed to provide an adequate outlet for the adjacent agricultural runoff and existing urban drainage systems. The Type 15, Flood Insurance Study, Crowley, Louisiana, prepared for Federal Insurance Administration, Department of Housing and Urban Development by the Soil Conservation Service, U.S. Department of Agriculture, contains maps showing the 100-year flood areas in Crowley.

Secondary benefits, including increased business activity and improved economic conditions in the immediate vicinity of Church Point will result from the project. Economic activities will be stimulated by an increased sense of security and the opportunity to plan future developments without consideration of frequent flooding.

The flood hazard of other urban communities in the watershed will not change with installation of project measures. Monetary values were not calculated for reduction of nuisance-type damages and increase in quality of life as a result of project channels.

Project channels will be dug from one side, with consideration given to providing the most effective shade for channel water during the summer months. Channel excavation procedures are illustrated by appendix G, figures 5 and 6.

Aesthetic resources will be affected in the 19 miles of channel to be worked through forest land and 34 miles through open land where woody vegetation grows along the banks. Trees inside the channel rights-of-way may be aesthetically pleasing because of unique characteristics of size, form, color, leaf texture, bark, flowers, or fruits. Such trees will be preserved wherever they will not seriously affect construction or operation and maintenance.

There are no known geodetic control survey monuments that are located within the area to be disturbed by the installation of structured measures.

There are no properties listed in the National Register of Historical Places that will be affected by installation of structural measures. This project will have no effect on any known archaeological or historical sites.

Erosion and Sediment - Erosion and the resulting sedimentation and turbidity will decrease with the installation of the planned project measures. Sheet erosion over the entire watershed will be reduced from 4.9 tons per acre per year to 4.4 tons per acre per year. This is a reduction of 8 percent.

During the 10-year project installation period, sediment being delivered to Bayou des Cannes will be reduced approximately 149,600 tons. Annual sediment being delivered to this point after the installation period will be reduced from 250,800 tons to approximately 218,531 tons. This is a reduction of 13 percent. This reduction not only reflects the reduction in sheet erosion, but also reflects the trapping effect of the weirs that will be installed. Allowances for sediment were made in the design of these structures. The graph and chart on the following pages will illustrate these reductions by evaluation units and areas.

Several channel features and construction procedures will reduce the amount of sediment derived from channel construction and insure channel stability.

1. Channel work will be done so that it affects only one bank.

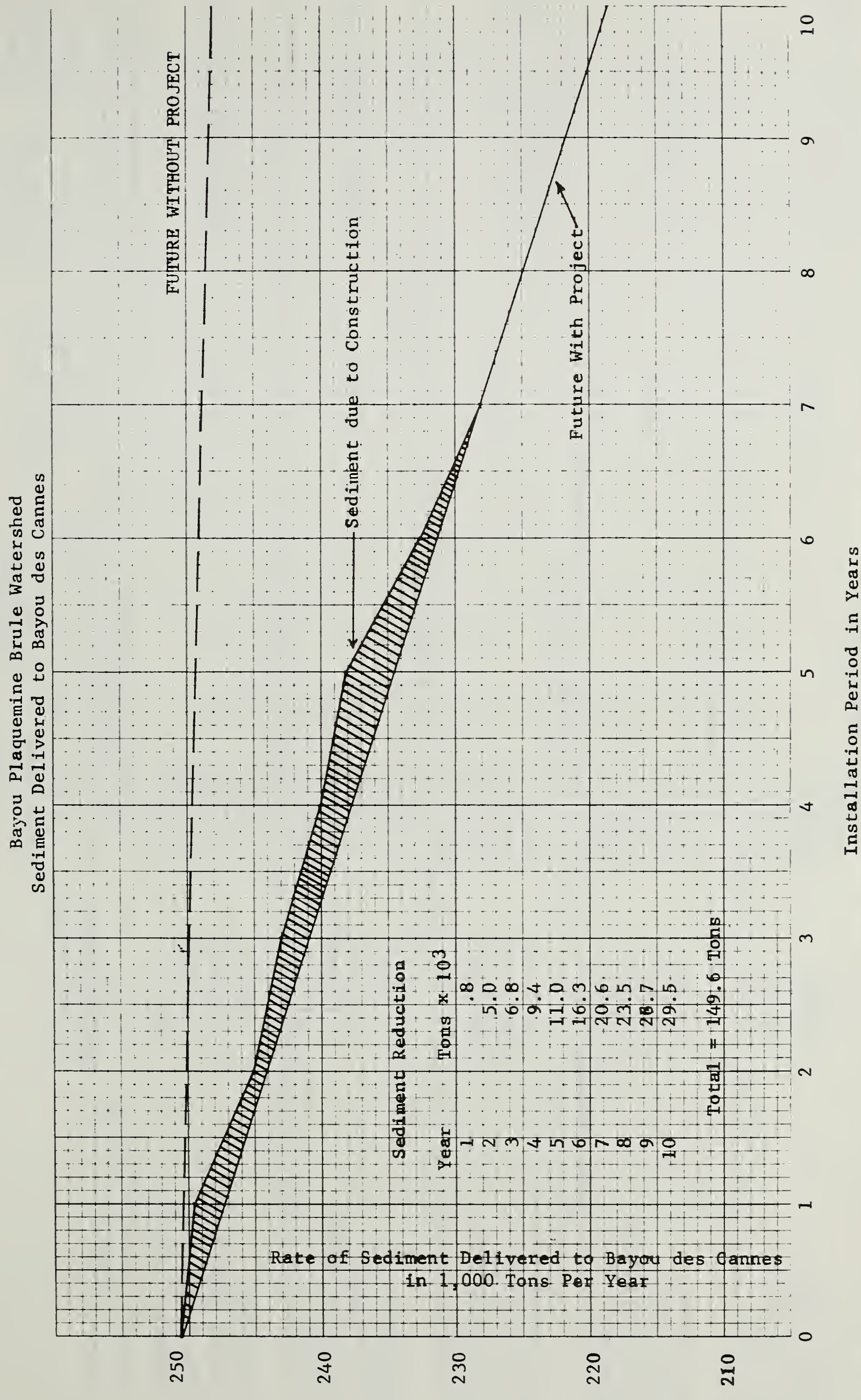
2. Vegetative cover will be established within 90 days after construction. An estimated average of 2,167 tons of sediment per year for 6 years will be generated by construction and would normally be delivered to Bayou des Cannes.

3. Weirs will be constructed prior to channel work upstream from them, and will trap a large percentage of sediment produced during construction. Project-induced sediment will be offset by the reduction in volume of sediment from sheet erosion that will be achieved by land treatment and structural measures.

4. Channel design velocities are commensurate with the materials to be encountered during construction.

5. Channel side slope designs will insure stable banks.

6. Where possible, project channels will empty into undisturbed vegetated channels which will act as filtering agents.


Bayou Plaquemine Brule Watershed
Sediment Delivered to Bayou des Cannes
FUTURE WITHOUT PROJECT
Sediment due to Construction
Future With Project
Sediment Reduction
Year Tons x 10³
1 .8
2 5.0
3 6.8
4 9.4
5 11.0
6 16.3
7 20.6
8 23.5
9 26.7
10 29.5
Total = 149.6 Tons
Rate of Sediment Delivered to Bayou des Cannes
in 1,000 Tons Per Year
Installation Period in Years
0
1
2
3
4
5
6
7
8
9
10
250
240
230
220
210

EROSION AND SEDIMENT REDUCTION

	Sheet Erosion (tons/year)	Sediment Delivered to Bayou Plaquemine Brule (tons/year)	Sediment Delivered to Bayou des Cannes (tons/year)	Construction Sediment (tons)	Construction Sediment to Bayou Plaquemine Brule (tons)	Constructio Sediment to Bayou des Ca (tons)
EVALUATION UNIT I						
Present	98,418	26,573				
Future Without	99,489	26,862				
Future With	91,252	24,638		4,952	2,476 3rd yr	2,228
Reduction	8,237	2,224				
EVALUATION UNIT II						
Present	41,252	18,563				
Future Without	41,378	18,620				
Future With	37,748	14,439		1,560	1,092 2nd yr	983
Reduction	3,630	4,181				
EVALUATION UNIT III						
Present	372,697	104,355				
Future Without	365,620	102,374				
Future With	339,892	80,895		6,127	1,225 1st yr	612
Reduction	25,728	21,479			1,225 6th yr	612
EVALUATION UNIT IV						
Present	270,974	130,068				
Future Without	269,065	129,151				
Future With	244,902	94,042		21,208	2,651 1st yr	1,325
Reduction	24,163	35,109			7,953 5th yr	3,975
EVALUATION UNIT V						
Present	357,056	142,822				
Future Without	352,311	140,924				
Future With	319,861	127,944		11,670	1,362 1st yr	544
Reduction	32,450	12,980			6,808 4th yr	2,723
TOTAL WATERSHED						
Present	1,140,000	422,381	250,800			
Future Without	1,127,863	417,931	248,130	45,517	24,792	13,002
Future With	1,033,655	341,958	218,531			
Reduction	94,208	75,973	29,599			

Fish and Wildlife - As a result of modification of 229 miles of project channels, there will be a decrease in the amount of time that water will flow in the ephemeral channels because of increased capacity. Also, there will be more rapid fluctuation of the water levels in these channels.

Although the fisheries are of low quality in the intermittent channels, project work will have some detrimental effects where construction occurs. Turbidity and suspended solids concentrations in the area of construction and in waters immediately downstream from channel construction will increase temporarily during construction. Removal of cover, potholes, and areas of attachment for the benthic organisms will result in the biological productivity being lowered slightly. This will cause a degradation of habitat for alligators (if present), waterfowl, and other aquatic wildlife species when this occurs. Recovery of the biological productivity to near its original conditions should occur within 1 to 2 years depending upon the recovery of the benthic community, the water quality, and adequate cover in channels to preproject condition.

The predominance of commercial species such as catfish, buffalo, carp, gar, and shad should not change since these species are able to tolerate the existing poor water quality.

Channels will be enlarged in 6 miles of ponded water. Five miles have been previously worked; 1 mile is a natural, unmodified channel. Project construction will cause most potholes, in channel cover, and bank cover on one side to be removed. Water temperature will increase slightly because some trees and other bank vegetation will be removed. Phytoplankton and benthic organism production will be interrupted until preproject conditions return. The biological productivity will decrease slightly but the species composition or diversity will remain unchanged. The rate of recovery of the biological productivity will be similar to that of the intermittent channels.

Approximately 193 miles of the 218 miles of ephemeral channels to be worked will be enlarged and 25 miles will be cleared. All of the ephemeral channels have been previously worked except 1 mile. Fish populations are insignificant in the ephemeral channels because they have water for only a short duration after a rain and are usually dry at other times. However, important lower food chain organisms such as aquatic insects, amphibians, and crustaceans are produced in these channels. The effect of project construction will reduce the amount of these organisms temporarily. These organisms will recover to near their original populations as the habitat recovers to previous condition.

Seven structures for water control (weirs) will be installed to minimize damages to fish and wildlife as a result of the project. They will be installed prior to construction of channels upstream from them. These structures will have several beneficial effects on the aquatic ecosystem. The 33 acres of ponded water upstream from the weirs will increase the amount of fish production by 15 pounds of fish per acre. Also, increased aquatic habitat for amphibians, reptiles, and wading birds will be provided. Since these structures are designed to act as sediment traps, some of the sediment induced by construction will be confined to construction areas and should settle in ponded water behind the weirs. The amount of sediment trapped depends upon rainfall and flow conditions at the time of construction. Another function of the structures is to reduce vegetative maintenance needed in the channels. This will reduce the amount of disturbances to the aquatic ecosystem in the future. However, shallow water in the upper portions of the ponded water may have occasional growths of undesirable aquatic plants.

Periodic blue-green algae blooms could occur during extended periods of low flow. However, the channel drainage area at the weirs is large enough to provide a frequent flushing action except during extended dry periods. Anabaena and Microcystis would be the most likely algal species associated with prolonged dry periods. If these blooms materialize, the algae give off a toxic substance which can be fatal to fish. Also, when the bloom dies, the process of decomposition can cause an oxygen shortage and be fatal to fish. The Sponsoring Local Organization will be responsible for identifying problem areas and will consult with local fisheries biologists for the action needed to alleviate the problem. Copper sulfate or its derivatives will be used to control the algal blooms.

The 33 acres of permanent water created by the seven weirs will have an average surface area of 4.7 acres, and an average depth of 1.7 feet. Because of the shallow water at these sites, and the small size of these impoundments, they offer poor quality water-based recreation. Most of the weir sites are fairly inaccessible to the general public. Consequently, no recreation developments such as boat ramps are anticipated at these sites. However, improved boat launching facilities and parking areas are needed along Bayou Plaquemine Brule and Bayou Wikoff but none are planned in this project.

Turbidity and concentrations of suspended solids will temporarily increase in the upper portion of Bayou Plaquemine Brule because of construction near Church Point and at project channel outlets into Bayou Plaquemine Brule. However, since no work is planned in the 24-mile reach having perennial flow, and in only 3 miles of the 23 mile reach having intermittent flow, project effect on the water quality

as a whole will be minor. Preproject monitoring studies have shown that the water in Bayou Plaquemine Brule already has high suspended solids, high turbidities, and high colors. (Refer to water quality data in ENVIRONMENTAL SETTING - Plant and Animal Resources.) Poor water quality presently causes commercial fish species to predominate. These species are adapted to poor water quality and will not be detrimentally affected by temporary increases in turbidity in Bayou Plaquemine Brule.

Bayou Plaquemine Brule flows into Bayou des Cannes, which flows south approximately 1.5 miles into the Mermentau River near the town of Mermentau. Because of the size of Bayou Plaquemine Brule Watershed (234,400 acres) as compared to the Mermentau River Basin (2,217,000 acres), project construction is not expected to significantly affect the water quality of the Mermentau River-Lake Arthur-Grand Lake Complex. No work is planned for the entire 24-mile perennial portion of Bayou Plaquemine Brule, and only 3 miles of the intermittent portion will be worked. The Mermentau River already has poor water quality conditions. (See tabulation in ENVIRONMENTAL SETTING - Physical Resources.) The lower undisturbed reach of Bayou Plaquemine Brule, downstream from Church Point, will settle out most of the sediment generated from construction. The amount of sediment approximately (24,792 tons) will be more than offset by the reduction in sediment derived from sheet erosion (approximately 75,973 tons per year). It is not anticipated that this reduction will cause any major change in the maintenance program on Bayou Plaquemine Brule. The project is not expected to cause any significant changes in the environment downstream from project measures. Increased use of soil conserving practices and engineering structures by landowners under the accelerated land treatment program will reduce the annual loss of soil by sheet erosion from 1,140,000 tons per year under preproject conditions to 1,033,655 tons per year with the project. Studies in various parts of the country have shown that soil conservation practices reduce erosion and sediment delivery rates. "The amount of sediment coming from watersheds having good conservation treatment at the Blackland Experimental Watershed, near Riesil, Texas, is only 12 percent of that from watersheds farmed without soil conserving practices."2/

Usually, nitrogen and phosphorus are the elements that limit plant growth. These nutrients enter surface water by discharge of raw or treated sewage, industrial wastes, erosion, and leaching from

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2/ U.S. Department of Agriculture, Agricultural Research Service, Wastes in Relation to Agriculture and Forestry, Miscellaneous Publication No. 1065 (Washington: U.S. Government Printing Office, 1968), p. 36.

the soil.[3/] When these nutrients become too abundant in water, they become problems in that they cause undesirable growth of aquatic plants or algae "blooms."

The best methods of preventing excessive fertilizer nutrients from entering the aquatic ecosystem are to apply only the recommended amount at the proper times and to use soil conservation practices that will reduce erosion to a minimum. These practices will be applied under the accelerated land treatment program of the project. As a result, the rate of eutrophication in watershed channels is not expected to increase.

The effects of pesticide usage on fish and wildlife is a complex problem and knowledge in many areas is still limited.[4/] However, research has shown that the chlorinated hydrocarbons such as DDT and its metabolites (DDD and DDE), aldrin, dieldrin, endrin, chlordane, BHC (benzene hexachloride) and toxaphene are the more detrimental pesticides to fish and wildlife species. This is because of their long-term persistence in the environment and their capacity to accumulate in body tissues which leads to the "biological magnification" of their concentrations through the food chains of predatory fish and wildlife.

Data gathered in one sampling period in the pesticide usage survey as explained under WATER AND RELATED LAND RESOURCE PROBLEMS, Plant and Animal Resource Problems, indicates that 17 different pesticides are currently being used by farmers in the watershed. The chemicals used include 11 herbicides (1 is a mixture), 5 insecticides, and 1 fungicide. The five insecticides include aldrin, carbofuran, methyl parathion, carbaryl, and toxaphene. A recent study[5/] indicated that the residue levels of pesticides in the environment are related to pesticide usage. Data from one sampling period of the Soil Conservation Service's Monitoring Program shows the following pesticide residues in fish tissues.

BHC (white crappie had 0.01 ppm and short nose gar had 0.02 ppm)
DDT (white crappie had 0.13 ppm and short nose gar had 2.69 ppm)

3/ Ibid., p. 7.

4/ U.S. Department of the Interior, Fish and Wildlife Service, Bureau of Sport Fisheries and Wildlife, Handbook of Toxicity of Pesticides to Wildlife, Resource Publication No. 84 (Washington: U.S. Government Printing Office, 1970), p. 1.

5/ E. A. Epps et al., "Preliminary Report on a Pesticide Monitoring Study in Louisiana," Bulletin of Environmental Contamination and Toxicology, Vol. 2, No. 6 (New York: Springer-Verlog, Inc., 1967). p. 38.

Toxaphene (white crappie had 0.27 ppm and short nose gar had 4.2 ppm)
Dieldrin (bluegill had 0.04 ppm and short nose gar had 0.57 ppm)

Gizzard shad were also analyzed for the above pesticides and levels ranged in between the low and high listed for white crappie, short nose gar, and bluegill. Bottom sediment contained DDT (0.09 ppm to 0.13 ppm) and dieldrin (0.0 ppm to 0.01 ppm). Results of chlorinated hydrocarbon residues detected in the water samples have not been received from the laboratory. Another study referred to also indicated that DDT and its metabolites had 0.35 and 0.48 ppm residue in fish in the Mermentau River.[6/] Comparing the amount of pesticide residues measured in fish and bottom samples with the pesticides currently being used indicates a change in the kinds of pesticides being applied. Chlorinated hydrocarbons such as DDT and its metabolites, BHC, and dieldrin are not currently being used but, because of their application in past years and persistence in the environment, are still present in fish and sediment. According to data from the 1973 monitoring, five insecticides that were used included aldrin, carbofuran, methyl parathion, carbaryl, and toxaphene. Aldrin, carbofuran, and methyl parathion were used by the majority of farmers interviewed. Data gathered from this initial survey indicates a trend away from the highly persistent chlorinated hydrocarbon group, to less residual, more biodegradable types of insecticides such as organophosphates and carbamates.

Use of pesticides is anticipated to increase slightly with the project. However, increased use of land treatment practices will be applied that will reduce erosion and sediment rates which will, in turn, reduce the amount of pesticides that enter the channels and bayous. In addition to land treatment, correct application of these chemicals in proper amounts is important in limiting the amount entering the environment.

Project action will not affect the existing ponds, lakes, or Type 5 wetlands. No ponds or lakes are planned for project construction. However, there will be 33 acres of permanent water created as a result of the project. Project construction will have some effect on the 12,272 acres of Type 1 wetlands. The project will affect about 560 acres of Type 1 wetlands (seasonally flooded hardwoods) by reducing the amount of water introduced onto the wetlands as a result of overbank flooding from low intensity rainstorms. This will reduce the value of the fringes of these wetlands as feeding areas for waterfowl. However, the channels in wetlands areas were designed so that the amount and duration of water on the wetlands as a result of direct precipitation will not be affected. The channel designs allow for excessive overbank flow through these areas during the design storm and will not provide additional adequate drainage and flood prevention

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6/ Ibid.

sufficient for these areas to be cleared and farmed. The affected Type 1 wetlands are along the upper floodplains of Bayou Jonas and Cole Gully. The lower 2 miles of construction on Bayou Jonas will not affect the wetland through which it passes because the flooding in this area is determined by backwater from Bayou Plaquemine Brule.

In addition, there will be a loss of the vegetation on about 40 acres of Type 1 wetlands due to conversion to channel rights-of-way. This loss will be along 8 miles of channel banks, mainly Bayou Jonas, Cole Gully, Prather Gully, and the lower ends of a few other small channels. However, access to these areas will be improved with the provision of berms for channel maintenance.

As a result of project installation, forest land will be reduced 90 acres. This will result in the commitment of 15 acres, 34 acres, and 41 acres of forest to channels, spoil, and berms, respectively. Although the 90 acres is relatively small, its loss will adversely affect forest wildlife species such as deer, squirrels, wood ducks, woodcock, swamp rabbits, and nongame species which depend on the forest land for essential habitat requirements. Bottom land hardwoods provide the most productive habitat for deer and squirrels. Woodcock, swamp rabbits, and nongame species utilize forest habitat for feeding and cover requirements. Wood ducks utilize nesting, feeding, and brood cover that is available in forest land. For the effects that the loss of forest habitat will have on wildlife populations, refer to the tabulation on page 100, "Changes in Habitat and Estimated Game Population Because of Project Construction." The 34 acres of spoil in the forest land will be planted with hardwood seedlings such as water oak, sweet pecan, and willow oak to mitigate the loss of forest habitat. Vegetation of the spoil and berms will make the channels more aesthetically pleasing than if they were left unvegetated. Plants with wildlife, conservation, and aesthetic value will be used to revegetate these areas.

Cottontail rabbits utilize both open land and forest land for habitat requirements. Open land in agricultural areas furnishes much of the rabbit's food supply; forested or brushy areas such as wooded channel banks provide protective cover. Cottontails will be adversely affected by the 76 acres of open land, forest and wooded channel banks converted to channels. However, converting land to spoil and berms will not detrimentally affect rabbit populations since these areas will be as good as preproject habitat once vegetation is reestablished. Berms and spoil will be seeded to some food plants such as ryegrass and other tender vegetation for rabbits and other wildlife species. The stages of natural plant succession that will develop along the spoil, provide excellent habitat for rabbits and other wildlife species. The photographs on page 101 show the edge effect and brushy field borders utilized by rabbits, quail, and other wildlife species.

Open land wildlife species will be benefited by project action. The conversion of forest land and wooded channels banks to spoil and berms will increase the amount of open land habitat by 109 acres. This change as a result of the project will increase doves, quail, and other nongame species populations. However, these increases will be of a temporary nature for species such as doves and quail. For a period of approximately 2 to 3 years, the vegetation established on the berms and spoil will have food value for doves and quail. After this period, the process of plant succession will cause these areas to decrease in the quality of habitat they provide, especially to doves. Quail will still feed to some extent in these areas, since they are scratching type feeders using grow-up areas more than doves. Also, quail, rabbits, and other wildlife species will utilize the latter stages of plant succession on the spoil for protective and nesting cover. Due to the relatively small amount of this type of cover in the area, it is an extremely important part of their habitat.

The tabulation on page 100 gives the habitat changes and estimated fish and game population changes as a result of project construction.

The conversion of forest land to channels, berms, and spoil may cause a minor loss of habitat for some "endangered" wildlife species. Since the remaining forest land habitat is not expected to undergo any additional post project changes, and since most individuals of these species inhabit extensive territories, no significant effects to the "endangered" wildlife species should result from the project. However, the cumulative effects of minor changed land use nationwide as a result of this project and additional projects, could have detrimental effects on the "endangered" species because of the combined loss of valuable habitat.

Usually, crawfish production is considered an agricultural crop, but it will be discussed with fish and wildlife. Project action is not expected to affect any of the existing crawfish producing areas. According to the "Summary of Crawfish Farmers of Louisiana,"[7/] Acadia Parish has 20 crawfish farms with 1,100 acres of crawfish production and St. Landry Parish has 2 crawfish farms for a total of 600 acres. Of this 1,700-acre total in both parishes, there are 19 crawfish ponds with a total of 550 acres in the watershed.

Economic and Social

Agriculture, the economic base of the watershed, will be enhanced. The project will increase agricultural development, which will increase the profits of processors and sellers of agricultural products as well

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7/ U.S. Department of Agriculture, Soil Conservation Service, Summary of Crawfish Farmers of Louisiana (Unpublished data, October 1973).

CHANGES IN HABITAT AND ESTIMATED GAME POPULATION
BECAUSE OF PROJECT CONSTRUCTION

Species	Habitat	Acres Gained or Lost	Number of Animals
Doves (Migratory)[a]	Open land	+109	+327
Quail[a]	Open land	+109	+ 13
Rabbit	Open land and forest land[b]	- 76	- 25
Squirrel	Forest land	- 90	- 90
Deer	Forest land	- 90	- 1
Waterfowl (Migratory)	Open land and forest land[c]	-140	- 7
Waterfowl (Resident)	Forest land and open land[c]	-140	- 2

[a] Temporary gains
[b] Includes acres of open land, wooded channel banks, and forest land converted to channels
[c] Includes acres of open land converted to channels and total amount of forest land lost.

ESTIMATED STANDING CROPS OF FISHES

Category	Pre-Project		Post-Project		Acres Gained Or Lost	Pounds Of Fish
	Acres	Total Pounds	Acres	Total Pounds		
Ponds and lakes	142	21,300	142	21,300	-0-	-0-
Intermittent Channels	251	6,275	252	6,300	+ 1	+ 25
Existing Ponded Water Channels	89	6,230	89	6,230	-0-	-0-
Perennial Water	290	37,700	290	37,700	-0-	-0-
Weirs	-0-	-0-	33	495	33	495
TOTAL		71,505		72,025	34	520

Edge effect between cultivated field and rotation pasture

Brushy field border

as other goods. The economy of the area will be enhanced by the higher salaries of those presently employed and those hired to do the additional work.

The higher level of protection, the reduced fixed cost of production, and the increased quality of products will give farmers an incentive to increase production inputs. They will buy better quality seed and will use more fertilizer and lime. Expenditures for products used in harvesting and hauling the product to market will increase. This will stimulate economic activity within the watershed and in the surrounding areas. More jobs will be created in the processing and service industries. The value of property will increase, which will increase the tax base. Thus, the parishes will have more funds to develop health, recreational, educational, and other needed facilities.

Installation of the project will create about 89 man-years of local labor for a 6-year period. The expenditure of $3,349,300 for the installation of land treatment measures will create an additional 96 man-years of labor over a 10-year period. Operation and maintenance will provide 200 man-years of local labor for the life of the project.

The project will help slow the trend of decreasing number of farms and increasing size of farms. With the project, optimum-sized labor-saving equipment will be more efficiently used on the farms. This and other factors will decrease costs and increase yields, thereby increasing the profitability of farming and will cause farming to be more competitive for labor with other industries, thereby slowing the out-migration trend.

The gross sales of farm products are expected to increase approximately 10 percent. The average annual overall net farm income will increase about $900 per farm. With this increased and more stable income, the farmer may improve his house or buy a better automobile. He will be able to afford better dental and health care, more insurance, better clothes, and other amenities of life for his family. He will be able to pay higher wages to his employees who will then be able to improve their living conditions.

The problems to watershed residents caused by flooded roads will be reduced. School buses will be able to travel their scheduled routes more regularly which will improve school attendance. The public will be better able to utilize the roads for farming operations and marketing and for commuting to places of employment and business during wet periods. Nuisance damages to residences will be reduced.

Local traffic patterns will be interrupted temporarily during the replacement of bridges and culverts resulting in inconveniences to the people involved. Detour routes will be available such that no one will be deprived of access to their destination. Noise levels will increase at the construction sites. Increases in turbidity will occur downstream temporarily until the exposed areas are revegated.

Local secondary benefits will accrue after the installation of project measures. The values added to the immediate products and service as a result of activities stemming from or induced by the project will enhance the overall local economy. The increased production of goods stemming from the project will place new demands on the processing, transporting, and marketing industries within the area. Processors, business establishments, and other individuals not directly benefited, will profit from increased sales of their agriculturally-associated goods and products. Suppliers of the additional materials and services required as a result of project-production of goods and services induced by the project will stimulate local and regional economic activity. Although some agricultural products are processed within the watershed, most are processed outside of the watershed, increasing economic activity.

The project will reduce damages significantly to 40 residences, 11 commercial properties and an industrial complex in the town of Church Point. These damages are in the form of income loss, maintenance and repair costs, and many of the inconveniences caused by flooding. Project installation will improve the overall socio-economic environment of the town of Church Point.

Favorable Environmental Impacts

Economics will be improved.

Floodwater and drainage problems will be reduced, resulting in lower agricultural production costs, better quality of products and higher yields.

There will be an increase in average annual farm income.

The average annual agricultural floodwater damages will be reduced 71 percent.

A total of 111,600 acres of cropland and pastureland will directly benefit from the combined program of land treatment and structural measures.

An additional 74,900 acres of cropland and pastureland will benefit from accelerated land treatment and rotational systems.

An estimated 480 farmers will directly benefit from the installation of project measures and land treatment. An additional 40 farmers will benefit from accelerated land treatment only. These measures will provide benefits for 2,100 farm family members and farm employees.

The trend of decreasing number of farms and increasing size of farms will be slowed.

Erosion and the resulting sedimentation and turbidity will be decreased with installation of planned project measures.

Sediment, as a result of sheet erosion, will be reduced from 1,140,000 tons per year to 1,033,655 tons per year.

Sediment delivered to the Mermentau River as a result of sheet erosion will be reduced by 13 percent (250,800 tons/year to 218,531 tons/year).

Sheet erosion will be reduced about 8 percent or 94,208 tons/year.

Agricultural chemicals delivered downstream will be reduced due to reduction in sheet erosion as a result of land treatment measures.

Under present conditions, a storm of 1 percent chance occurrence (100-year frequency) will produce a peak stage on Bayou Plaquemine Brule at Louisiana Highway 95 in Church Point of approximately 45.8 feet mean sea level (m.s.l.). With project measures installed, the 100-year peak stage will be about 43.6 feet m.s.l. or 2.2 feet lower.

The town of Church Point will be provided protection from flooding from the 100-year storm. This will reduce significant damages to 40 residences, 11 commercial properties, and an industrial complex. Nuisance damages to residences and to the public will be reduced. Urban damages, exclusive of road and bridge damages, will be reduced 84 percent.

Flood damages to roads and bridges will be reduced.

Access to project channels will be improved.

Installation of seven structures for water control (weirs) will create 33 acres of permanent water.

The creation of 33 acres of permanent water will result in additional water for agricultural uses, fish and wildlife habitat, and reduce channel maintenance.

Temporary increases of mourning doves, bobwhite quail, and some nongame species will result from the conversion of 109 acres of forest and wooded channel banks to spoil and berms along channels.

Installation of the project will create about 185 man-years of local labor over the installation period; operation and maintenance will create 200 man-years of local labor over the project life.

Adverse Environmental Effects

Construction will cause approximately 13,000 tons of sediment to be delivered to Bayou des Cannes during the 6-year project construction period.

Temporary increases in turbidity and suspended solids downstream will result from construction.

Occasional periods of noxious aquatic weed growth may occur in the permanent water created by the seven structures for water control (weirs).

About 654 acres of open land, 96 acres of wooded channel banks, and 90 acres of forest land not presently occupied by channels, berms, and spoil will be disturbed during construction. In addition to this, 1,088 presently occupied will be disturbed. This will result in some reductions of both game and nongame animals.

Temporary reductions in the biological productivity of the aquatic ecosystems will occur because of channel enlargements, clearings, and temporary lowering of water quality.

Project rights-of-way will require additional open land resulting in a net loss of about $50,000 in agricultural production.

Peak stages will be increased up to 0.3 feet in Bayou Plaquemine Brule downstream from modified channel reaches.

The aesthetic resource will be changed along 19 miles of channels passing through forest land and along 34 miles of channels in open land where woody vegetation grows along its banks.

Existing potholes, in-channel cover, and cover on one bank will be removed. This will cause a degradation of habitat for alligator (if present), waterfowl, and other aquatic wildlife resources.

There will be a slight increase in water temperatures where large trees and other bank vegetation are removed. This will be most prevalent in ponded water areas.

IMPACTS

There will be a loss of 90 acres of potential habitat for "endangered" wildlife species through the conversion of forest land to channels, berms, and spoil.

Vegetation (hardwoods) on about 40 acres of Type I wetlands will be cleared for rights-of-way and flooding along the fringes of about 560 acres of Type I wetlands will be reduced as a result of channel work.

ALTERNATIVES

Land Treatment Only

The major land treatment measures that could be installed are conservation cropping systems, crop residue management, land smoothing, drainage mains and laterals, drainage field ditches, pasture and hayland management, pasture and hayland planting, wildlife wetland habitat management, and wildlife upland habitat management. These measures could be installed to adequately treat only about 5,000 acres that have little or no damage from flooding and inadequate drainage. The installation cost would be about $135,000. Land treatment could also be installed on marginal land, but the effectiveness would be limited because of inadequate protection.

The selection of land treatment measures is dependent on the soils and the planned crops. Soils that have a wetness problem and are used for row crops, such as cotton and soybeans, require the timely removal of surface water and the improvement of internal drainage. These soils normally have slow permeability that severely restricts percolation and lateral movement of water in the root zone. Drainage field ditches, drainage mains and laterals, and land smoothing or land leveling will accomplish the timely removal of surface water if adequate outlets are provided. These measures, combined with crop residue management and conservation cropping systems will improve the tilth of the soils and increase the movement of air and water within the soils. A complete program is required for maximum benefits of any land treatment measures.

This alternative would not eliminate the need for adequate outlets for on-farm drainage systems. Therefore, the installation of land treatment only would not provide the desired benefits of the project.

Land Use More Tolerant to Wet Soil Conditions

A crop which could be more extensively used in rotation with rice is crawfish. The production of this crustacean fits in well with rice culture. Rice levees constructed to hold irrigation water also serve as embankments which can turn ricefields into crawfish ponds. Plant stubble and chaff left after the rice harvest serve as food for the crawfish. Irrigation systems used for rice production serve as a source of water for the ponds.

The topography of the area is nearly level, which provides very slow surface runoff without some artificial water conveyance system to accelerate water flow. Most of the soils are very slowly permeable and possess a high water holding capacity. These conditions are conducive to nonstructural land use alternatives that could include crawfish farming and pastures with tolerant native grasses.

Commercial crawfish production in the rice area began in the late 1940's or early 1950's. In 1973, 20 farms had 1,100 acres in crawfish ponds in Acadia Parish and 2 farms had 600 acres in crawfish ponds in St. Landry Parish.

There are 55,600 acres of land in this watershed presently being used for the production of rice, rice-rotational pasture, soybeans, cotton, corn, and sweet potatoes which could be converted to crawfish or native pasture. An estimated 17,000 acres of rice and 5,300 acres of rice-rotational pasture would be suited for crawfish production. Some 23,400 acres of soybeans, 4,800 acres of cotton, 2,100 acres of corn, and 3,000 acres of sweet potatoes could revert to native vegetation.

The present net returns are estimated to be $6,448,000 with the present land use distribution that is on the land. The alternative discussed above would return an estimated $4,391,000 or an estimated loss in net returns of $2,057,000 annually.

Floodproofing and Land Treatment

The topography of the watershed is nearly level and problems caused by high rainfall affect large contiguous areas. Establishing levees around individual farms or hydrologic units would be a remote possibility. The high annual direct precipitation would necessitate the installation of pumping plants large enough to remove the water within the leveed areas. In addition, drainage systems within the leveed areas would be needed to get the water to these pumping stations. Floodproofing cropland and pastureland would cost approximately $31,800,000.

The land treatment program would include conservation measures to adequately treat 124,000 acres at a cost of $3,349,300. The conservation measures needed to treat this area would include, but would not be limited to, conservation cropping systems, crop residue management, land smoothing, drainage field ditches, drainage mains and laterals, pasture and hayland management, pasture and hayland planting, wildlife wetland habitat management, and wildlife upland habitat management. These measures will be installed singly or in combinations as needed. They will reduce runoff, improve water quality, and improve the tilth of the soils.

This alternative would not reduce the requirement for a drainage system. The additional levees with the required channels would result in an environmentally unacceptable alternative.

Channel Work

Three broad alternatives involving channel work were investigated. These were:

1. Bayou Plaquemine Brule and Bayou Wikoff would be enlarged for their entire length. All laterals that drain into these bayous would be enlarged as needed for adequate drainage and flood prevention. This alternative would prevent flooding on the first floors of homes and places of business in Church Point during the 100-year frequency flood, and would provide better farm drainage, but would increase the flood stage at Crowley and further downstream. The total structural measures cost of this alternative would be approximately $9,500,000.

2. Bayou Plaquemine Brule and all laterals would be enlarged needed to provide flood protection for Church Point, and adequate farm drainage and flood protection to agricultural land, excluding that in the flood plain of Bayou Plaquemine Brule below Church Point. This would increase the 100-year frequency stage on Bayou Plaquemine Brule below Crowley at Bayou Blanc by about 0.2 foot.

3. This alternative would include all works proposed in Alternative 2 plus enlargement of Bayou Plaquemine Brule below Crowley. In order to accomplish this, the channel below Crowley would need to have a minimum bottom width of 500 feet. This would reduce stages on Bayou Plaquemine Brule so that the three laterals that remove floodwaters from Crowley could be enlarged sufficiently to provide a 100-year level of flood protection. The total structural measures cost of this alternative would be approximately $16,900,000.

The Sponsors voted to accept Alternative 2 as the most desirable plan for the project area.

Channel Work and Land Treatment Investigated for Alternative 2

Various sizes and lengths of channels were studied to determine whether the 1.5-year, 3-year, or 5-year level of agricultural protection would be the most desirable. The effects of each of these levels of protection were evaluated for without- and with-project conditions. The effects of the 1.5-year and 5-year levels were considered to be alternatives and are discussed in this section. The 3-year level of agricultural protection and the 100-year level of urban protection for Church Point on which the project is based is discussed in the ENVIRONMENTAL IMPACTS section.

The land treatment measures to be installed for this alternative would be the same as those discussed under the Floodproofing and Land Treatment alternative. The effects of land treatment would be the same for the 3- and 5-year level of protection; however, the downstream limitation of the 1.5-year level of protection would reduce the effectiveness of the land treatment program, the amount of land that could be adequately treated, and the amount of land disturbed.

Wildlife habitat changes and effects on animal populations were also studied. (See tabulation on the following page.)

Smaller Channels - Providing a 1.5-year level of protection by channel work would require about 205 miles of channel work with 1,472,900 cubic yards of excavation. The total installation cost would be an estimated $3,866,200. The annual cost, including operation and maintenance would be $310,500. The damage reduction would be about 48 percent. Land used for channels would change in the following manner:

1. Land within channels would increase from 661 to 667 acres.

2. Land in berms would increase from 107 to 500 acres.

3. Land in spoil would increase from 261 to 514 acres.

Land used for channels and berms will increase because of channel enlargement and leaving wider berms to serve as maintenance access. Land occupied by spoil will increase because existing and project-created spoil will not be spread for channels in most cases.

The land treatment program under this level of protection would include the installation of the necessary conservation measures to adequately treat 59,500 acres. Some conservation measures would be installed on an additional 9,400 acres of cropland and pastureland. The cost will be about $1,607,700. The measures to be installed include the same features discussed under Floodproofing and Land Treatment.

Type of habitat in which channels are located was categorized according to examples shown in ENVIRONMENTAL SETTING - Plant and Animal Resources. Channels located on cropland or pastureland which had no trees or brush on the berms and spoil were categorized as "open land" channels. Channels located in cropland or pastureland having narrow strips of trees or brush on the berms and spoil were categorized as "wooded channel banks." Channels located in forests were categorized as "forest." Land used for channels, berms, and spoil within these three categories would change in the following manner:

1. Open land acres occupied would increase from 726 to 1,250 acres.

2. Wooded channel bank acres occupied would increase from 216 to 280 acres.

3. Forest land acres occupied would increase from 87 to 151 acres.

The increase in wooded channel bank acreage occupied would be a change in wildlife habitat because the berm and one side of the

EFFECTS OF THREE LEVELS OF PROTECTION ON HABITAT CHANGES AND POPULATION OF FISH AND WILDLIFE SPECIES
BAYOU PLAQUEMINE BRULE WATERSHED

Species	Animals a/ Per Acre	Acres	Total Animals	1.5-Year Level of Protection e/		3-Year Level of Protection e/		5-Year Level of Protection e/	
				Acres b/	Animals b/	Acres b/	Animals b/	Acres b/	Animals b/
Dove (Migratory)	3/1	187,100	561,300	+135	+405	+109	+327	+ 87	+261
Quail	1/3	187,100	23,387	+135	+ 16	+109	+ 13	+ 87	+ 10
Rabbit	1/3	212,200	70,733	- 19	- 6	- 76	- 25	-128	- 42
Squirrel	1/1	25,100	25,100	- 79	- 79	- 90	- 90	-100	-100
Deer	1/220	25,100	114	- 79	- 1	- 90	- 1	-100	- 1
Waterfowl (Migratory)	c/	212,342	23,488	- 87	- 2	-140	- 7	-187	- 12
Waterfowl (Resident)	d/	212,342	2,662	- 87	- 2	-140	- 2	-187	- 2

a/ Game populations data developed in cooperation with the Louisiana Wild Life and Fisheries Commission.
b/ Indicates changes because of construction under three levels of protection.
c/ One duck per 8 acres of open land; one duck per 250 acres of forest.
d/ One duck per 75 acres of open land; one duck per 150 acres of forest.
e/ Protection to agricultural land from a storm which is expected to occur on an average of once in this many years.

ESTIMATED STANDING CROPS OF FISHES

Category	Preproject			Postproject a/		
	Acres	Pounds per Acre	Total Pounds	Acres	Pounds per Acre	Total Pounds
Ponds and lakes	142	150	21,300	142	150	21,300
Intermittent channels	251	25	6,275	252	25	6,300
Ponded water channels	89	70	6,230	89	70	6,230
Perennial water (Plaquemine Brule Bayou)	290	130	37,700	290	130	37,700
Weirs	0		0	33	15	495
Total			71,505			72,025

a/ Effects of project with 3-year level of protection.

channel would be kept partially free of woody vegetation under the maintenance program; see appendix G, figures 5 and 6. The acres of spoil disturbed in the wooded channel banks would be allowed to grow back into trees by natural plant succession, and those in the forest land would be planted back to trees. Out of the 1,681 acres required for channel rights-of-way, 151 acres would be associated with clearing only and 1,530 acres with excavation.

<u>Larger Channels</u> - Providing a 5-year level of protection would require about 233 miles of channel work with 2,127,500 cubic yards of excavation. The total installation cost would be $5,093,300. The annual cost, including operation and maintenance would be $397,700. The damage reduction would be about 82 percent. Land use for channels would change in the following manner:

1. Land within channels would increase from 661 to 792 acres.

2. Land used for berms would increase from 107 to 594 acres.

3. Land used for spoil would increase from 261 to 610 acres.

Land used for channels and berms will increase because of channel enlargement and leaving wider berms to serve as maintenance access. Land occupied by spoil will increase because existing and project-created channel spoil will not be spread for channels in most cases. The land treatment program would include the installation of the necessary conservation measures to adequately treat 124,000 acres, or 52 percent more than with the 1.5-year level of protection. In addition, 19,500 acres of cropland and pasture-land will have some conservation measures applied. The cost would be $3,349,300. The measures which would be installed include the same features discussed under <u>Floodproofing and Land Treatment</u> alternatives.

Land used for channels, berms, and spoil within the three categories -- open land, wooded channel banks, and forest -- would change in the following manner:

1. Open land acres occupied would increase from 726 to 1,484 acres.

2. Wooded channel bank acres occupied would increase from 216 to 333 acres.

3. Forest acres occupied would increase from 87 to 179 acres.

The increase in wooded channel bank acreage occupied would be a change in wildlife habitat because the channel and berm would be kept partially free of woody vegetation under the maintenance program; see appendix G, figures 5 and 6. The acres of spoil

disturbed in the wooded channel banks and forest land would be allowed to grow back into trees by natural plant succession. Out of the 1,996 acres required for channel work, 201 acres would require clearing only and 1,795 acres would require excavation.

Urban Protection

Three alternatives were considered in Church Point and four alternatives were considered in Crowley for minimizing floodwater problems. The alternative of channel work on Bayou Plaquemine Brule at Church Point is part of the planned project; the alternative of channel work at Crowley was previously discussed in the third broad alternative of Channel Work.

Floodproofing - This alternative measure would protect buildings but would not significantly alleviate the floodwater damages to streets, yards, and other cultural features, because the extent of flooding would not be changed. The total structural measures cost of this alternative would be approximately $1,400,000 for Crowley and $500,000 for Church Point.

Levee and Pump Off - Constructing a levee around the problem areas at Church Point and Crowley and installing pumps to facilitate internal drainage would require extensive relocations and massive levee sections in parts of the flood plains. The total structural measures cost of this alternative would be approximately $4,500,000 for protection at Crowley and $850,000 for protection at Church Point.

Floodwater Retarding Structure and Channel Work - This alternative consists of approximately 5 miles of channel work in the vicinity of Crowley and a floodwater retarding structure located on Bayou Plaquemine Brule upstream from Crowley. This floodwater retarding structure would provide flood protection for a limited distance downstream. This would reduce stages on Bayou Plaqumine Brule so that the three laterals that remove floodwaters from Crowley could be enlarged sufficiently to provide a 100-year level of flood protection.

The structure would require 12,160 acres of land for flowage easements. Relocation of 150 or more families and reconstruction of utility lines, pipelines, roads, churches, and cemeteries would be required. Much of this area is also in bottom land hardwoods that serve as habitat for many forms of wildlife. The fluctuating water levels of the structure would be detrimental to much of this vegetation. The permanent pool would eliminate 1,440 acres of bottom land hardwood habitat. The estimated structural measures cost of this alternative is $12,085,000.

ALTERNATIVES

No Project

The "No Project" alternative would include the current land treatment program. Presently, 21 percent of the total land treatment measures needed to achieve and report land adequately treated have been applied. Land adequately treated is defined as land used within its capabilities on which the proper conservation practices have been applied to compensate for its limitations. The data on the following page summarizes the land treatment measures applied to date and costs. With "No Project," the current rate of installation of land treatment measures will remain about the same.

With the "No Project" alternative, the water problem will continue to exist. Sponsors do not have sufficient funds to finance the installation of a complete channel system. Only certain channels would be worked and no orderly, planned procedure would be followed. Appurtenant measures needed to control erosion and sediment would not be installed. Damages incurred with this haphazard approach to the forest land and aquatic ecosystems would not be mitigated. However, the pursuit of this alternative would probably insure continuation of the existing fish and wildlife habitat in areas where this piecemeal approach would not be used.

Currently, about 85 percent or 149,000 acres of the total cropland (176,000) is in a rotation system of rice-soybeans-pasture. The lack of drainage reduces the effectiveness of the rotation because soybeans cannot be planted on some areas. These areas are utilized for rice and pasture despite water damages.

All property and nuisance damages presently resulting from flooding will continue. If the project is not installed, net annual benefits of about $1,669,600 will be foregone.

Land Treatment
Bayou Plaquemine Brule Watershed
Acadia and St. Landry Parishes, Louisiana

LAND TREATMENT	Unit	Applied to Date	Total Cost 1/ (Dollars)
Bedding	Acs.	250	7,500
Conservation Crop. System	Acs.	129,176	387,500
Contour Farming	Acs.	130	400
Crop Residue Management	Acs.	71,188	142,400
Disposal Lagoon	No.	2	2,400
Ponds	No.	185	74,000
Irrigation Field Ditch	Ft.	2,389,727	716,900
Fish Pond Management	No.	180	1,800
Grade Stabilization Structure	No.	102	15,300
Irrigation Pipe Line	Ft.	55,097	220,400
Irrigation System	No.	324	324,000
Irrigation Water Management	Acs.	43,745	87,500
Irrigation Land Leveling	Acs.	8,668	260,000
Land Smoothing	Acs.	69,554	695,500
Dr. Main & Lateral	Ft.	560,000	168,000
Pasture & Hayland Management	Acs.	4,653	27,900
Pasture & Hayland Planting	Acs.	1,363	68,100
Access Road	Ft.	800	4,000
Rec. Area Improvement	Acs.	12	700
Str. for Water Control	No.	620	62,000
Dr. Field Ditch	Ft.	820,000	82,000
Well	No.	98	49,000
Wildlife Wetland Habitat Mgmt.	Acs.	735	700
Land Adequately Treated	Acs.	48,400	---
Total			3,398,000

1/ Price base 1974.

June 1974

SHORT-TERM VS. LONG-TERM USE OF RESOURCES

The level of drainage and flood protection provided by the project will improve cropping conditions which will allow higher crop yields, elimination of unnecessary costs, and better quality products. These conditions will induce farmers to apply needed measures and practice better conservation. The increased application of land treatment measures will insure sustained production for future generations. Since the major land use is now agriculture and is expected to be so in the future, the project is compatible with the long-term use of the land and water. With the planned maintenance, it will continue to be effective in conserving land and water resources after its designed 50-year life unless new crop varieties and farming methods are developed which would require a higher level of protection. Forest and agricultural acreages are not expected to change significantly in the future.

The Bayou Plaquemine Brule Watershed is in the Mermentau River Basin of the Louisiana Coastal Resource Subregion of the Lower Mississippi Region. Three soil and water conservation districts and parts of eight others cover the Louisiana Coastal Resource Subregion. An estimated 40 percent of the total land treatment needs of the subregion has been installed.

About 72 percent of the land area in the Mermentau River Basin is in some stage of development, planning, or requesting assistance under Public Law 566. Approximately 15 percent of the total land area in the Lower Mississippi Water Resource Region is covered by Public Law 566 projects which are either installed or approved for planning. The status of Public Law 566 projects can be observed in the tabulation on the following page.

STATUS OF PUBLIC LAW 566 PROJECTS

Item	Projects Installed		Projects Approved For Planning		Project Applications Received		Total	
	(No.)	(Acres)	(No.)	(Acres)	(No.)	(Acres)	(No.)	(Acres)
Louisiana Coastal Resource Subregion								
Louisiana	4	231,210	12	1,890,331	4	380,600	20	2,502,141
Total	4	231,210	12	1,890,331	4	380,600	20	2,502,141
Lower Mississippi Water Resource Region								
Louisiana	6	296,590	21	2,819,270	7	531,820	34	3,647,680
All Other States	19	501,044	40	6,946,689	Not Tabulated		59	7,447,733 a/
Total	25	797,634	61	9,765,959	7 a/	531,820 a/	93 a/	11,095,413 a/

a/ Does not contain applications received for states other than Louisiana.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

About 33 acres of land within ephemeral, intermittent, and ponded channels will be committed to permanent water for at least the life of the project. Structures for water control (weirs) will be located in the channel rights-of-way, so no additional land will be required.

The project will require an additional 840 acres for rights-of-way. This will cause a reduction in open land of 654 acres, in forest land of 90 acres, and in wooded channel banks of 96 acres. This increase in rights-of-way will require an additional 76 acres for channel area, 448 acres for berm, and 316 acres for spoil.

Channels have to be maintained and kept clear of obstructions in order to function as planned. As a result, channels will preclude the use of 768 acres of land for any other purpose for at least the life of the project. Grasses and forbs will be allowed to grow in the channels and on the berms. One side of the channels in forest land or with woody channel banks will not be disturbed during construction nor during the life of the project. Selected trees will be allowed to remain on the berms and none in the channels on the side being disturbed since maintenance equipment access will be necessary. (See appendix G, Figures 5 and 6.) Spoil areas in the forest land will be planted with hardwood seedlings. Use of the berm and spoil in the open land will generally be used as part of the farm road system. Otherwise, they will not be precluded for any particular purpose.

The total monetary value which will be expended for project installation, including land treatment and structural measures, amounts to $8,406,800. The expenditure of labor and capital resources on items such as fuel, equipment, sand, gravel, cements, steel, etc., needed for project installation, once expended, cannot be reversed.

CONSULTATION AND REVIEW WITH APPROPRIATE AGENCIES AND OTHERS

General

On April 25, 1969, representatiges of the 12 drainage districts in the watershed met to discuss their need for a comprehensive and coordinated plan for flood prevention and drainage. They subsequently drafted a watershed application and submitted it to the Acadia and the St. Landry Parish Police Juries and the Acadia and St. Landry Soil and Water Conservation Districts for their endorsement. The 16 organizations became co-sponsors of the proposed watershed project and their leaders signed the formal application prior to December 11, 1969. One of the drainage districts withdrew later upon discovering that no project channel work was needed within its boundaries. The Louisiana Soil and Water Conservation Committee approved their application on January 6, 1970.

Authorization to provide planning assistance under provisions of Public Law 566 was requested January 26, 1970.

A preliminary wildlife review was held on July 8, 1971. Representatives of the Louisiana Wild Life and Fisheries Commision (LWFC) and the Soil Conservation Service (SCS) participated in this review. Since planning had not been authorized, only preliminary information furnished in the Sponsors' project proposal was available. A trip report was prepared by SCS and concurred in by LWFC. Both agencies agreed that if project planning should be authorized, they would work together on the planning as applicable.

Watershed planning was authorized on January 24, 1972.

Interested parties and agencies were notified of this authorization. Ten agencies acknowledged receipt of the notification and offered their assistance. The Sponsors notified 13 individuals and agencies of a public hearing on the proposed planning of the Bayou Plaquemine Brule Watershed. The date of hearing was set for March 3, 1972. Local newspapers announced this hearing, explained its purpose, and encouraged all interested individuals and agencies representatives to attend and participate. Sixty-eight people attended this hearing. In attendance were the Mayor of Crowley, one State representative, one State senator, and representatives of the sixteen original Sponsors, U.S. Fish and Wildlife Service (USFWS), Louisiana Wildlife Federation, Farmers Home Administration, Southwest Louisiana State School, Crowley Post Herald,

Crowley Daily Signal, Civil Defense, Agricultural Stabilization and Conservation Service, Louisiana Intracoastal Seaway Association, Louisiana Department of Public Works (LDPW), LWFC, and SCS.

The status of the project and the events concerning it were reviewed. After opening remarks by the meeting chairman and representatives of LDPW and SCS, a preliminary report was read. Full public expressions of viewpoints were solicited from all in attendance. Eighteen people took part in the lengthy discussions that followed this invitation. The LWFC and USFWS agreed to assist and work with the LDPW and SCS in the planning process. Estimates were made of planning time required.

The Sponsors indicated their readiness to proceed with the plan and inquired what could be done to speed up this process.

Letters from the Mayor of Crowley and Louisiana Wildlife Federation were read by the meeting chairman and recorded as part of the minutes of this hearing.

The Sponsors prepared a draft work outline on March 2, 1972 and finalized it on April 7, 1972. Representatives of LWFC, USFWS, LDPW, and SCS assisted in preparing this outline.

By letter dated April 19, 1972 LWFC made several general comments and recommendations regarding fish and wildlife and requested their consideration during planning. USFWS made similar informal comments by a letter dated May 3, 1972. The Louisiana State University Rice Experiment Station and the St. Landry Police Jury wrote letters to the involved Soil and Water Conservation Districts expressing their plans for carrying out a sound land treatment program on public lands under their control. Easement values of land rights-of-way were established by the Sponsors and transmitted to SCS May 8, 1972.

A public meeting to review the results of preliminary studies of alternatives and future courses of action was held at the Federal Building in Crowley, Louisiana on December 20, 1972. Representatives of the Sponsors, city of Crowley, Acadia Parish Agricultural and Conservation Service, LDPW, and SCS were present.

The alternatives discussed were (1) urban flood protection for Church Point and adequate drainage and flood protection for agricultural land including that in the flood plain of Bayou Plaquemine Brule below Church Point, (2) flood protection for Church Point and adequate drainage and flood protection for agricultural land excluding that in the flood plain of Bayou Plaquemine Brule below Church Point, and (3) alternative 2 above plus the channel work required to reduce flood

stages on Bayou Plaquemine Brule in the vicinity of Crowley. The Sponsors voted unanimously to accept alternative 2 as the most desirable plan for the project area. These three alternatives are discussed further in the ALTERNATIVES section.

A follow-up meeting with the Sponsors was held at the Federal Building, Crowley, Louisiana, on March 12, 1974. Representatives of the Sponsors, city of Crowley, Louisiana Cooperative Extension Service, and SCS were present. Details obtained from more specific studies of alternative 2 were explained and reviewed. Following this review and discussion, representatives of the Sponsors reiterated their approval of this alternative.

The SCS, LWFC, and USFWS met again on March 13, 1974. The purpose of the meeting was to review (1) proposed structural measures, (2) the effects that these measures would produce, and (3) modification of installation procedures and installation of additional structural measures to minimize adverse effects. The modifications and additional structural measures were compared to those suggested by both wildlife agencies during earlier field trips. Additional comments and recommendations were solicited after this comparison. No further suggestions for modifications were received from the representatives of these two agencies.

Another public information meeting was held on March 21, 1974 in the Acadia Parish Courthouse. The meeting, having been announced in local and area newspapers, was attended by 52 people. Seven representatives from Federal agencies, 5 from State agencies, 16 from Sponsors, 1 from a local newspaper, 1 from the Sierra Club, and 22 other interested individuals were present. Although statements were made discussing other alternatives, no opposition was expressed against the planned project.

In order to obtain viewpoints from a different source on environmental concerns, professional services were obtained from Coastal Environmentals, Inc. Employees of this corporation have either M.S. or Ph.D. degrees in geography (flood plain management), zoology, marine science, chemistry, geology, and geo-chemistry. Their primary expertise is environmental evaluation and environmental impact statement preparation. A team representing interests in geography, biology, geology, and zoology reviewed the work plan and environmental impact statement and made suggestions for improvement.

Copies of the preliminary draft work plan and environmental impact statement were mailed to local, State, and Federal agencies and concerned groups for the informal field review. A public meeting was held on November 14, 1974 to present informal field review comments and the responses or changes resulting from these comments. Persons in the audience were given an opportunity to question and comment on the material presented.

CONSULTATION

The Louisiana Historical Preservation and Cultural Commission and the Curator of Anthropology at Louisiana State University were contacted to obtain the locations of places of historical or archaeological importance. The Forest Service assisted in the survey of forest land needs and in the watershed plan formulation.

Bayou Plaquemine Brule Watershed was listed as a high priority watershed in the Southwest Louisiana River Basin Report. Purposes identified in this study were evaluated during work plan development.

The agencies, organizations, and individuals listed below were asked to comment on the draft environmental statement.

Department of the Army
Department of Commerce
Department of Health, Education and Welfare
Department of the Interior - Office of Environmental Project Review
Department of Transportation
Environmental Protection Agency
Advisory Council on Historic Preservation
Federal Power Commission
Bureau of Environmental Health, Water, and Air Quality
Attorney General's Office Environmental Section
U.S. Corps of Engineers (District Engineer)
Louisiana Forestry Commission
Louisiana Forestry Association
Governor's Council on Environmental Quality
Louisiana Commission on Inter-governmental Relations
Louisiana Department of Highways
Department of Geography and Anthropology, Louisiana State University
Louisiana Farm Bureau
Louisiana Department of Art, Historical, and Cultural Preservation
Louisiana State Parks and Recreation Commission
Louisiana State Soil and Water Conservation Committee (Executive Director)
Louisiana Cooperative Extension Service
Wildlife Management Institute
Environmental Defense Fund
Environmental Impact Assessment Project
Office of State Planning
Joint Legislative Committee on Environmental Quality
Louisiana Geological Survey
Louisiana Department of Conservation
Louisiana Department of Agriculture
Louisiana Stream Control Commission
Louisiana Department of Public Works Atchafalaya Basin Division
Commandant, U.S. Coast Guard
Regional Environmental Control Director
Louisiana Wildlife Federation (President)
U.S. Fish and Wildlife Service
Chancellor of Center for Agricultural Science and Rural Development, Louisiana State University

Louisiana State Soil and Water Conservation Committee (Chairman)
Water Resources Division - Geological Survey-District Chief
Bureau of Outdoor Recreation
Division of Natural Resources and Energy
Water Resources Division - National Marine Fisheries Service
Chairman, State ASCS Committee
ASCS State Executive Director
Bureau of Public Works
National Park Service
Environmental Protection Agency - Region VI
Louisiana Wildlife Federation (Water Resources Projects Committee)
Louisiana Health and Human Resources Administration - Division of Health
Louisiana Wildlife Federation (Richard W. Bryan, Jr.)
National Audubon Society
Sierra Club-Delta Chapter - Chairperson
The Izaak Walton League of America
National Wildlife Federation
Friends of the Earth
National Resources Defense Council, Inc.
Mr. Clifford M. Danby
Orleans Audubon Society
Sierra Club - Delta Chapter - Michael Osborne

Discussion and Disposition of Each Comment on Draft Statement

Each issue, comment, or suggestion for improvement is summarized and a response is given on the following pages. Comments are numbered where agencies have supplied multiple comments. The original letters of comment appear in Appendix J.

U.S. Environmental Protection Agency

Generally, the draft statement is very complete and addresses many of the project-associated impacts. However, we suggest that the following comments be considered in the final statement and work plan:

Comment No. 1: We suggest that the statement include a more complete discussion of the impacts associated with the alteration, modification or reconstruction of existing facilities (e.g., bridges) that will be affected by project implementation. The location of major facility changes should be provided. This information would be helpful in evaluating the total impact of the project.

Response: The first full paragraph on pages 19 and 78 of the environmental impact statement, and work plan, respectively, was rewritten as follows:

Alteration, modification, or reconstruction of some existing facilities such as bridges, culverts, and pipelines will be necessary to insure proper functioning of planned structural measures. The work on bridges involves the enlargement of the

channel cross section by excavating under the bridge, reinforcing one or more bents of pilings, or lengthening a bridge in order to widen the channel. Work on the culverts involves replacing existing culverts with larger ones, lengthening existing culverts, or lowering the grade of existing pipelines. No bridges, culverts, or pipelines will be relocated.

This alteration, modification, or reconstruction includes, but is not limited to, 6 bridges and 11 culverts on State and Federal highways, 67 bridges and 135 culverts on parish and private roads, pipelines at 57 locations, 32 irrigation flumes, 11 watergates, and utility lines and fences at about 137 locations. The work will be done concurrently with channel construction. The specific location of existing facilities to be altered are shown on the design profiles and cross sections in the working files. Replacement of any State and Federal highway bridges or culverts will be coordinated with the Louisiana Highway Department early in the design phase prior to construction. Designs will be in accordance with current standards for traffic and type of highway. Structural measure installations are expected to be completed in a 6-year period.

There are no relocations of residences or businesses required.

The following was inserted as the first and sixth paragraph on page 103 and 104 of the environmental impact statement and work plan, respectively.

Local traffic patterns will be interrupted temporarily during the replacement of bridges and culverts resulting in inconveniences to the people involved. Detour routes will be available such that no one will be deprived of access to their destination. Noise levels will increase at the construction sites. Increases in turbidity will occur downstream temporarily until the exposed areas are revegetated.

Comment No. 2: According to the draft statement and work plan, construction on tributary channels to Bayou Plaquemine Brule and Bayou Wikoff will be terminated at a distance that will reduce adverse impacts on fisheries in the two waterways. However, it appears from the project map provided that many of the side channels are excavated to their confluence with the main channels. This inconsistency should be discussed. Also, the approximate distance at which construction will be halted should be given where possible.

Response: The first sentence of the third full paragraph on page 18 and fourth full paragraph on page 76 of the environmental impact statement and work plan, respectively was rewritten as follows:

Construction on channels tributary to Bayou Plaquemine Brule and Bayou Wikoff will be terminated at a distance ranging from 200 feet to 1,000 feet before entering these bayous in order to lessen the adverse effects to fisheries.

The following was inserted as the last sentence of the above mentioned paragraphs.

For further discussion of this subject, see item 4, page 21 and 80 of the environmental impact statement and work plan, respectively.

General Comment No. 3: These comments classify your Draft Environmental Impact Statement as LO-1. Specifically, we have no objections to the proposed plan at this time. We believe your agency has presented an adequate discussion of the impacts of the proposed project and the alternatives available. The classification and the date of our comments will be published in the Federal Register in accordance with our responsibility to inform the public of our views on proposed Federal actions, under Section 309 of the Clean Air Act.

Response: None Necessary.

U.S. Department of Health, Education, and Welfare - Office of the Secretary -

Comment: This will acknowledge receipt of your letter dated transmitting the above-mentioned draft Environmental Impact Statement.

We have forwarded this statement to Jerry Stephens, the Regional Environmental Officer in this area, and he will respond directly to

you. If you have any questions concerning this statement, please address them to:

Mr. Jerry Stephens
1114 Commerce Street
Room 925
Dallas, Texas 75202

We appreciate the opportunity to comment on this statement.

U.S. Department of Health, Education, and Welfare - Regional Office

Comment: Pursuant to your request, we have reviewed the Environmental Impact Statement for the above project proposal in accordance with Section 102(2)(c) of P.L. 91-190, and the Council on Environmental Quality Guidelines of April 23, 1971.

Environmental health program responsibilities and standards of the Department of Health, Education, and Welfare include those vested with the United States Public Health Service and the Facilities Engineering and Construction Agency. The U.S. Public Health Service has those programs of the Federal Food and Drug Administration, which include the National Institute of Occupational Safety and Health and the Bureau of Community Environmental Management (housing, injury control, recreational health and insect and rodent control).

Accordingly, our review of the Draft Environmental Statement for the project discerns no adverse effects that might be of significance where our program responsibilities and standards pertain, provided that appropriate guides are followed in concert with State, County, and local environmental laws and regulations.

We therefore have no objection to the authorization of this project insofar as our interests and responsibilities are concerned.

Response: None necessary.

U.S. Department of Transportation - Federal Highway Administration

Comment: Your December 23, 1974 letter, transmitted to us two copies of the draft environmental statement for the captioned project. We have reviewed the statement and have nothing to add to the comments contained in our preliminary draft review letter dated November 7, 1974.

We are pleased that one of the benefits from the project will be reduced flood damages to roads and bridges in the area.

Response: None necessary.

U.S. Department of the Interior - Geological Survey

Comment: We replied on January 16, 1975, to the request for review of the Bayou Plaquemine Brule Watershed environmental impact statement originated by our headquarters office. A copy of that reply is attached.

We have reviewed the subject statement and find it to be reasonably adequate and accurate in its evaluation of the impact of the proposed action on the hydrologic environment.

Response: None necessary.

Advisory Council on Historic Preservation

Comment: This is in response to your request of December 23, 1974 for comments on the draft environmental statement (DES) and watershed work plan (WWP) for the Bayou Plaquemine Brule Watershed, Louisiana. Pursuant to its responsibilities under Section 102(2)(c) of the National Environmental Policy Act of 1969, the Advisory Council has determined that your DES and WWP appear adequate concerning compliance with Section 106 of the National Historic Preservation Act of 1966 and the provisions of Executive Order 11593, "Protection and Enhancement of the Cultural Environment," issued May 13, 1971. However, the Council noted that the Soil Conservation Service (SCS) has contracted for a cultural survey of the area to be impacted by this undertaking and that the results of this survey will appear in the final environmental statement and work plan.

The Council wishes to remind SCS that should this survey identify cultural properties which meet the criteria for inclusion in the National Register of Historic Places that will be affected by the project, it is required to afford the Council an opportunity to comment in accordance with the "Procedures for the Protection of Historic and Cultural Properties" (36 C.F.R. Part 800), (copy enclosed). Steps to determine eligibility and effect are detailed in Section 800.4 of the procedures.

Should you have any questions or require any additional assistance, please contact Michael H. Bureman of the Advisory Council staff at P. O. Box 25085, Denver, Colorado 80225, telephone number (303) 234-4946.

Response: The following paragraphs have been rewritten and inserted on page 22 and 81 of the environmental impact statement and work plan, respectively.

There are no properties listed in the National Register of Historic Places that will be affected by the installation structural measures. Should any archaeological or historical sites be discovered during the installation of structural measures, construction will be stopped. The Secretary of Interior (National Park Service), the Curator of Anthropology, and the Historical Preservation Officer will be notified, and will be given an opportunity to evaluate and make recommendations for salvage or mitigation before construction continues. Also, the Advisory Council on Historic Preservation will be afforded an opportunity to comment in accordance with the "Procedures for the protection of Historic and Cultural Properties."

The State Historic Preservation Officer's letter dated January 9, 1975 states that his department does not know of any sites on the National Register of Historic Places or being actively nominated to the National register which would be affected by this proposed project.

<u>U.S. Department of Transportation - U.S. Coast Guard</u>

Comment: This is in response to your letter of 23 December 1974 addressed to Commandant, U.S. Coast Guard concerning a draft environmental impact statement for the Bayou Plaquemine Brule Watershed, Acadia and St. Landry Parishes, Louisiana.

The Department of Transportation has reviewed the material submitted. We have no comments to offer nor do we have any objection to this project.

The opportunity to review this draft statement is appreciated.

Response: None necessary.

U.S. Department of Commerce

Comment: The draft environmental impact statement for "Bayou Plaquemine Brule Watershed, Acadia and St. Landry Parishes, Louisiana," which accompanied your letter of December 23, 1974, has been received by the Department of Commerce for review and comment.

The statement has been reviewed and the following comments are offered for your consideration.

A number of geodetic control survey monuments are located in the watershed area described in the subject document. If there is any planned activity which will disturb or destroy these monuments, the National Ocean Survey (NOS) requires not less than 90 days notification in advance of such activity in order to plan for their relocation. NOS recommends that funding for the proposed construction include the cost of any relocation required for NOS monuments.

Thank you for giving us an opportunity to provide these comments, which we hope will be of assistane to you. We would appreciate receiving a copy of the final statement.

Response: The following paragraph was inserted on page 88 and 89 of the environmental impact statement and work plan, respectively.

There are no known geodetic survey monuments that are located within the area to be disturbed by the installation of structural measures.

State of Louisiana - Department of Art, Historical and Cultural Preservation

Comment: This Department does not know of any sites on the National Register of Historic Places or being actively nominated to the National Register of Historic Places which would be affected by the proposed project.

Thank you for the opportunity for comment on the project.

Response: None necessary.

Louisiana Health and Human Resources Administration

Comment: The Watershed Work Plan and the Draft Environmental Statement concerning the above project have been reviewed by this office for probable effects upon insect vector control.

It is our conclusion that implementation of the project as planned should reduce the breeding habitats of mosquitoes of several species including both flood water and permanent water varieties.

Thank you for providing us the opportunity to review this proposed project.

Response: None necessary.

Louisiana Forestry Commission

Comment: This is to advise that we have no objection to the Environmental Impact Statement for the Bayou Plaquemine Brule Watershed.

Response: None necessary.

Louisiana Geological Survey

Comment: We have reviewed the Preliminary Draft of the Bayou Plaquemine Brule Watershed Work Plan and Environmental Impact Statement.

It is our feeling that the multiple land use concepts provided in this plan are commendable. Further, the anticipated reduction in floodwater damage from $983,700 per year to $280,800 per year is worth the project cost alone.

The plan appears to be well conceived and should prove to be a valuable asset to the area involved over a period of time.

We appreciate your letting us review this plan.

Response: None necessary.

U.S. Department of the Interior

Comment No. 1: Both documents state that mineral resources in the watershed are limited to oil and gas and that a deep-seated salt dome probably exists at Crowley. Neither document mentions the presence of other mineral resources such as sand and gravel, clays, and sulfur, nor mentions the existence of pipelines in the area. Although we do not anticipate a significant conflict between the proposed works of improvement and mineral resource extraction and exploration activity, we believe that final copies of both documents should acknowledge the existence of pipelines in the area and discuss plans for relocating or protecting them, if necessary.

Response: There are no known mineral deposits in this watershed except the ones mentioned. No existing pipelines are to be relocated.

The existence of pipelines that cross project channels have been acknowledged and the need for lowering or casing is discussed on page 19 and 79 of the environmental impact statement and work plan, respectively.

Comment No. 2: The proposed action will not adversely affect any existing or proposed unit of the National Park System, not any site eligible for registration as a National Historic, Natural or Environmental Education Landmark.

Response: None necessary.

Comment No. 3: The draft environmental impact statement and work plan adequately describe the proposed project and its effects on fish and wildlife resources.

We trust the foregoing information will be of assistance to you.

Response: None necessary.

U.S. Department of the Army - Office of the Assistant Secretary

Comment No. 1: In compliance with the provisions of Section 5 of Public Law 566, 83d Congress, the views of the

Secretary of the Army were requested for the Watershed Work Plan and Draft Environmental Statement for Bayou Plaquemine Brule Watershed, St. Landry and Acadia Parishes, Louisiana.

We have reviewed the work plan and foresee no conflict with any projects or current proposals of this Department. Comments on the draft environment statement are inclosed.

Response: None necessary.

Comment No. 2: The possibility of induced clearing of woodlands as a result of project implementation should be more fully discussed. The figures on land use changes with and without the project shown on page 21 of the EIS should be verified, especially in regard to forest land, since a stated objective is to increase level of protection from flooding and wetness.

Response: No insert in EIS or in the Work Plan.

Of the total 25,100 acres of forest land within the watershed, 24,100 acres are located downstream from any structural measures to be installed. The 1,600 acres of forest land that is anticipated to be cleared is scattered along the perimeters on the backside of existing fields. The acreages are the normal trend-clearing by land operators for field expansion for crop and pasture.

Comment No. 3: The Type 15, Flood Insurance Study for Crowley, Louisiana, referenced on page 88 of the EIS, and a current study on Bayou Plaquemine Brule and tributaries being done by our New Orleans District disagree on the extent of flooding associated with the 100-year flood. Further, studies of discharge on Bayou Plaquemine Brule are in progress by the Corps in cooperation with the Alexandria, Louisiana. SCS office.

Response: No insert in the EIS and the Work Plan.

The U.S. Army Corps of Engineers is in the process of developing Flood Plain Information on Bayou Plaquemine Brule and Tributaries, Crowley, Louisiana. Coordination has been developed between the Corps and SCS to resolve differences in computations

contained in the report being developed by the Corps and the published Type 15 Flood Insurance Study for Crowley, Louisiana developed by the SCS. These computation differences will be resolved.

Comment No. 4: The lower 19 miles of Bayou Plaquemine Brule was included as a navigation channel improvement by the River and Harbor Act of 25 June 1910. Commerce averaging in access of 16,000 tons per year has been reported each year since 1966. Maintenance in the form of aquatic growth control has been performed in recent years, and the State of Louisiana has cleared, snagged, and straightened the channel for flood control. The EIS omits mention of any effects, beneficial or adverse, that the proposed project would have on navigability in this waterway. We suggest that the probable effects of shoaling during the construction period and possible increased need for aquatic growth control be discussed in the EIS.

Response: The following was inserted as the third paragraph on page 54 and page 28 of the EIS and work plan, respectively.

The lower 19 miles of Bayou Plaquemine Brule was included as a navigation channel improvement by the River and Harbor Act of 25 June 1910. Commerce averaging in access of 16,000 tons per year has been reported each year since 1966.

The following inserted in the second paragraph after "construction" on line 13, page 95 of the EIS and the first paragraph after "construction" on line 13, page 98 of the work plan.

This amount of sediment (approximately 24,792 tons) will be more than offset by the reduction in sediment derived from sheet erosion (approximately 75,973 tons per year). It is not anticipated that this reduction will cause any major change in the maintenance program on Plaquemine Brule.

LIST OF APPENDIXES

Approved by Alton Mangum

Alton Mangum
State Conservationist

Date 12-10-74

APPENDIX A - COMPARISON OF BENEFITS AND COSTS FOR STRUCTURAL MEASURES

Bayou Plaquemine Brule Watershed, Louisiana

(Dollars)

Evaluation Unit	Average Annual Benefits 1/						Average Annual Cost 2/	Benefit Cost Ratio
	Reduction	More Intensive Land Use	Drainage	Redevel- opment	Secondary	Total		
I	97,400	15,400	69,100	7,700	23,100	212,700	55,100	3.9:1
II	41,900	7,000	31,700	3,300	9,500	93,400	22,500	4.2:1
III	167,700	28,900	130,200	6,600	47,300	380,700	50,900	7.5:1
IV	280,600	46,200	207,900	16,100	63,400	614,200	122,700	5.0:1
V	352,200	58,600	264,000	14,800	70,200	759,800	100,800	7.5:1
Project Administration	xxx	xxx	xxx	xxx	xxx	xxx	39,200	
GRAND TOTAL	939,800	156,100	702,900	48,500	213,500	2,060,800	391,200	5.3:1

1/ Current normalized prices for crop and pasture; 1974 prices for all other values

2/ Current prices

June 1974

APPENDIX B

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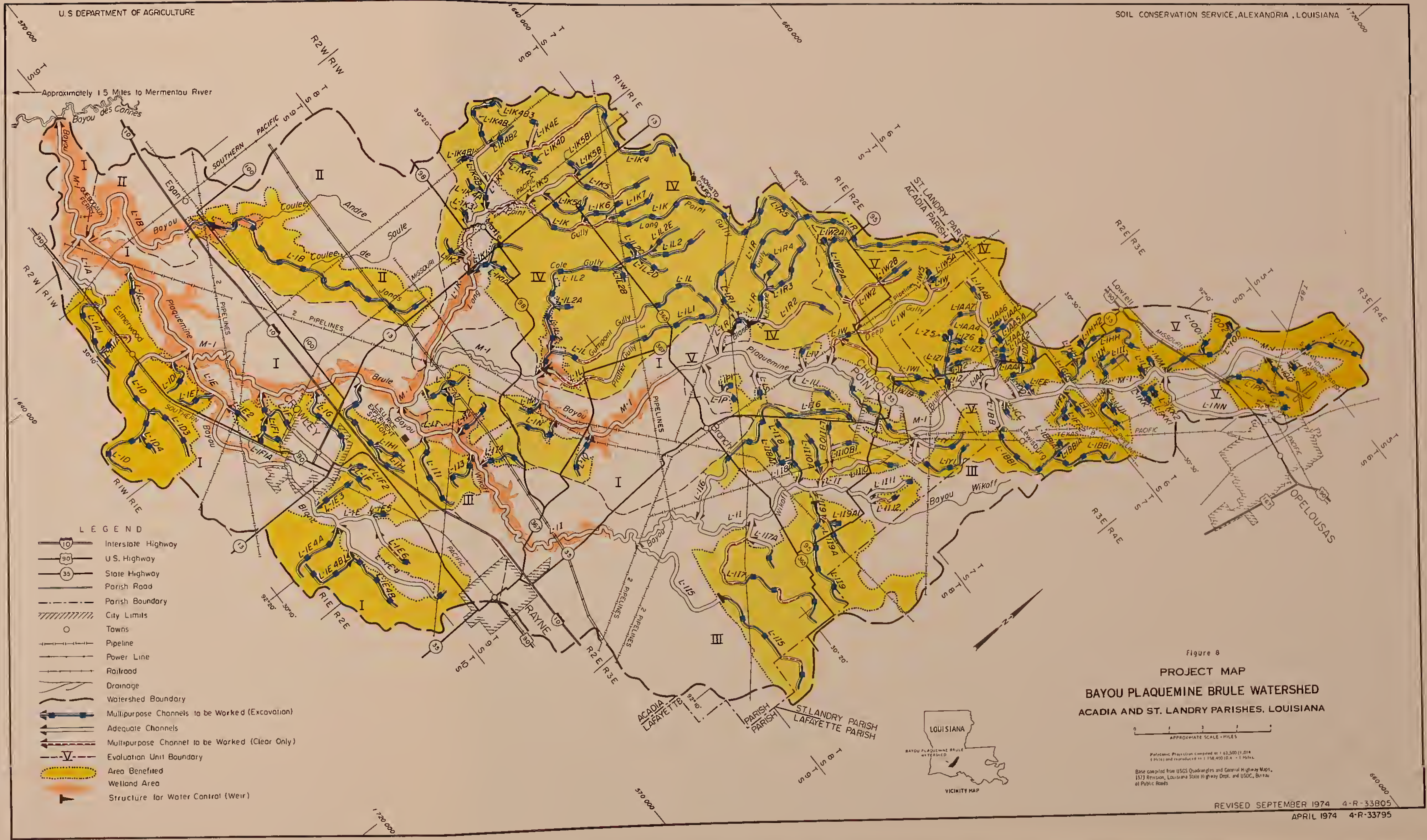

Figure 8

PROJECT MAP

BAYOU PLAQUEMINE BRULE WATERSHED

ACADIA AND ST. LANDRY PARISHES, LOUISIANA

APPENDIX D

INTERPRETATIONS OF WATER QUALITY PARAMETERS

CHLORIDE (Cl)

Water quality is dependent upon the use(s) of the water. The following data is not all inclusive but summarizes water quality criteria for some common uses.

Chloride is found in natural waters. It may originate from natural mineral origin or from (1) seawater contamination of underground water supplies, (2) salts spread on roads and bridges, (3) human or animal sewage, and (4) industrial effluents such as those from paper works, water softening plants, oil wells, and petroleum refineries. It is recommended that the chloride concentration not exceed a monthly average of 125 mg/l and that the maximum concentration not exceed 250 mg/l. The primary concern in setting these standards is economic damage rather than public health. For public supplies, water with a chloride concentration of less than 125 mg/l is rated "acceptable"; between 125 and 250 mg/l "doubtful"; and over 250 mg/l "unsatisfactory." For industrial use, the corresponding limits are: less than 50 mg/l, 50-175 mg/l, and over 175 mg/l, respectively.

"The Aquatic Life Advisory Commission of ORSANCO concluded that it is impossible to generalize on the effects of chloride concentrations on aquatic life, because each mixture of chlorides with other salts must be evaluated separately. Hart, et al., cite data indicating that among U.S. waters supporting a good fish fauna, ordinarily the concentration of chlorides is below 3 mg/l in 5 percent; below 9 mg/l in 50 percent; and below 170 mg/l in 95 percent of such waters."[1/]

In summary, it appears that the following chloride concentrations will not normally be deleterious to the specified use: (1) Domestic water supply, 125 mg/l; (2) Industrial water supply, 50 mg/l; (3) Irrigation water, 100 mg/l; and (4) Stock and wildlife, 1,500 mg/l.

1/ Jack Edward McKee and Harold W. Wolf, Water Quality Criteria, publication No. 3-A, (2nd edition; Sacramento: State Water Quality Board, 1963) p. 161.

COLOR (APPARENT)

Color of natural waters is derived from substances in solution or from materials in colloidial state.[2/] The standard unit used to measure color is the amount of color produced by adding 1 mg/1 of platinum to water. Results are expressed as units of color. "Color in excess of 50 units may limit photosynthesis and have a deleterious effect upon aquatic life, particularly phytoplankton and the benthos."[3/]

DISSOLVED SOLIDS

Water without some dissolved solids does not occur in nature and will not support aquatic life. Natural water contains an endless variety of dissolved materials in concentrations that will vary widely from place to place and from time to time. Some commonly occurring dissolved solids are: carbonates; bicarbonates; chlorides; sulfates; phosphates; nitrates of calcium, magnesium, sodium, and potassium; and traces of iron, manganese, and other elements. Many of these dissolved solids are essential to aquatic organisms for their growth, reproduction, and general well-being. All dissolved solids, which are necessary to aquatic organisms, have a range of concentrations that are both essential and tolerable. The tolerance levels for any one dissolved solid varies depending on the concentrations and kinds of other substances present. In general, the concentrations of dissolved materials in natural freshwaters are below the optimum for maximum productivity. In many instances, the addition of any of a large number of substances would be beneficial. However, the addition of what may be considered a beneficial substance must be planned and controlled so that it will not exceed favorable limits.[4/] It is believed that the total dissolved solids in a water course should not be increased more than one-third of the concentration it has under natural conditions.

Dissolved solids may influence the toxicity of heavy metals and organic compounds to fish and other forms of aquatic life. This is a

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2/ George K. Reid, Ecology of Inland Waters and Estuaries, (New York: Reinhold Publishing Corporation, 1961), p. 101.

3/ U.S. Department of the Interior, Federal Water Pollution Control Administration, Water Quality Criteria, (Washington: U.S. Government Printing Office, 1972), p. 48.

4/ Ibid., p. 39.

result primarily of the counteracting effect of hardness producing metals. "It has been reported that among inland waters in the United States supporting a good mixed fish fauna, about 5 percent have a dissolved solids concentration under 72 mg/l, about 50 percent under 169 mg/l, and about 95 percent under 400 mg/l."5/

In summary, based on a literature review, dissolved solids up to the following limits should not interfere with the indicated use: (1) Domestic water supply, 1,000 mg/l; (2) Irrigation water, 700 mg/l; (3) Stock and wildlife water, 2,500 mg/l; and (4) Freshwater fish and aquatic life, 2,000 mg/l.

HARDNESS

Hardness or calcium carbonate determinations are made with the Titration Method and expressed as mg/l. "In natural waters, hardness is a characteristic of water which represents the total concentration of just the calcium and magnesium ions expressed as calcium carbonate."6/ Hardness in water may be caused by the natural accumulation of salts from contact with soil and geological formations, or it may enter from direct pollution by industrial wastes. Hardness of waters is not considered a problem for fisheries in Louisiana. A guide for interpreting hardness is less than 40 mg/l is considered soft water, 90-150 mg/l is medium, while above 150 mg/l is considered hard water.

NITROGEN, AMMONIA (NH_3)

Nitrogen is present in natural waters in the form of an inorganic compound such as ammonia. Nitrogen, (ammonia) determination are made by the Nessler method and expressed in mg/l. The chemical state of nitrogen is dependent on the overall limnological conditions of the waterway since nitrogen, (ammonia) is quite unstable. In most freshwaters, the concentrations of this inorganic compound are relatively slight, but nevertheless, very important in determining the productivity of a given community. "Rivers known to be unpolluted have low ammonia concentrations, generally less than 0.2 mg/l as N."7/

5/ McKee and Wolf, op. cit., p. 183.

6/ U.S. Department of the Interior, Federal Water Pollution Control Administration, Chemical Analysis for Water Quality, 1967, p. 18-1.

7/ McKee and Wolf, op. cit., p. 132.

NITROGEN, NITRATE (NO_3)

Nitrogen, (nitrate) determinations are made by the Cadmium Reduction Method and expressed in mg/l. "Nitrogen, (nitrate) usually occurs in relatively small concentrations in unpolluted freshwater, the world average being 0.30 ppm."8/ Under normal conditions, the amount of nitrate in solution at a given time is determined by metabolic processes in the body of water, i.e., production and decomposition of organic matter. High nitrate concentrations in effluents, and water stimulate the growth of plankton and aquatic weeds. By increasing plankton growth and the development of fish food organisms, nitrates indirectly foster increased fish production.

"Hart, et al., report references to the effect that among United States' waters supporting a good fish life, ordinarily 5 percent have less than 0.2 mg/l of nitrates; 50 percent have less than 0.9 mg/l; and 95 percent have less than 4.2 mg/l."9/

OXYGEN (DISSOLVED) O_2

The dissolved oxygen content can be determined with a Hach Dissolved Oxygen test kit and expressed in mg/l. The content of dissolved oxygen in the water depends on several factors such as the temperature and salinity of the water, amount of organic material present, light present, and the abundance of phytoplankton. "For a diversified warm-water biota, including game fish, dissolved oxygen concentrations should be above 5 mg/l, assuming normal seasonal and daily variations are above this concentration. Under extreme conditions, however, they may range between 5 and 4 mg/l for short periods during any 24-hour period, provided that the water quality is favorable in all other respects."10/

8/ Reid, op. cit., p. 187.

9/ McKee and Wolf, op. cit., p. 225.

10/ U.S. Department of the Interior, Federal Water Pollution Control Administration, Water Quality Criteria, (Washington: U.S. Government Printing Office, 1972), p. 44.

OXYGEN SATURATION (percent)

Water is said to be saturated with oxygen when it contains all the dissolved oxygen it can hold at a given atmospheric pressure, temperature, and dissolved solids concentration. The difference between the actual oxygen content and the amount that could be present is called the saturation deficit. If the water contains more oxygen than should normally be present, it is said to be supersaturated. The ability of water to hold oxygen decreases with increases in temperature, dissolved solids, and reduction of atmospheric pressure.[11/] Natural waters are seldom at equilibrium or exactly saturated with dissolved oxygen. The reason for this is that temperatures and atmospheric pressure are always changing and physical, chemical, bio-chemical, and/or biological activities are continually utilizing or producing dissolved oxygen.

Oxygen saturation, like pH and alkalinity, is only a measurement, but it indicates the amount of potential oxygen actually present. High or low oxygen saturation values usually indicate high or low concentrations of dissolved oxygen, but this is not always the case. For instance, seawater at 15 degrees centigrade and 100 percent saturation will contain only 6 ppm dissolved oxygen while freshwater at 15 degrees centigrade and 100 percent saturation will contain 11 ppm dissolved oxygen.[12/]

In natural waters, oxygen saturation is usually between 70 and 120. Reading below this range usually indicates pollution which is utilizing the available oxygen and/or inhibiting the biological production of additional oxygen. Readings above this ranage usually come in mid to late afternoon on warm, sunny days, and indicate excessive photosynthetic activity by green plants in the water.

pH

The pH can be determined with a Hach test kit. The symbol "pH" is used to designate the logarithm (base 10) of the reciprocal of the hydrogen-ion concentration. If the value is less than 7, then the pH is considered acid and the lower the number the more acid. Values above 7 indicate a basic solution with the larger number being more

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11/ Charles W. Keenan and Jesse H. Wood, General College Chemistry (2nd ed.; New York, Evanston, London: Harper and Row, Publishers, 1957).

12/ George K. Reid, Ecology of Inland Waters and Estuaries (New York: Reinhold Publishing Corporation, 1961).

basic. "In most productive, fresh, natural water, the pH falls in the range between 6.5 and 8.5 (except when increased by photosyntheses activity)."13/ "Bass and bluegill can live from 4.6 to 11; growth and reproduction at either extreme is poor. The optimum level for growth for these fish is 6.5 to 8.5."14/

PHOSPHATE, ORTHO (PO_4)

The Orthophosphate determinations were made by the Ascorbic Acid Method which gives a reading in mg/l. This is a test for just orhtophosphates and does not indicate total phosphate content. The major sources of phosphorus entering freshwaters are domestic sewage effluents (including detergents), animal and plant processing wastes, fertilizer and chemical manufacturing spillage, various industrial effluents, and to a limited extent, sediment materials in agricultural runoff. "Phosphorus is stored in plankton and bottom sediments. Very little of this stored phosphorus reenters the water. Evidence from the addition of fertilizers to fish ponds and from what is known about the eutrophication of lakes by sewage supports the view that phosphorus plays a major role in production."15/ Most natural waters contain relatively low levels of phosphorus (0.01 to 0.05 mg/l) in the soluble state during periods of significant productivity."16/ "Optimum growth of all organisms studies in cultures can be obtained on concentrations from 0.09 to 1.8 mg/l of phosphorus while a limiting effect on all organisms will occur in phosphorus concentrations from 0.009 mg/l downward. The lower limit of optimum range of phosphorus concentration varies from about 0.018 to about 0.09 mg/l; and the upper limit from 8.9 to 17.8 mg/l."17/

13/ U.S. Department of the Interior, Federal Water Pollution Control Administration, Water Quality Criteria, (Washington: U.S. Government Printing Office, 1972), p. 40.

14/ U.S. Department of Agriculture, Soil Conservation Service, "Water Quality and Fish Culture," Biology Technical Note XII, 1968.

15/ U.S. Department of the Interior, Federal Water Pollution Control Administration, The Practice of Water Pollution Biology, Division of Technical Support, 1969, p. 40.

16/ U.S. Department of the Interior, Federal Water Pollution Control Administration, Chemical Analysis for Water Quality, 1967, p. 15-1.

17/ S. P. Chu, "The Influence of the Mineral Composition of the Medium on the Growth of Planktonic Algae," Journal of Ecology, 31(2), 1943, pp. 109-148.

SODIUM (Na)

Sodium is a very active metal which does not occur free in nature. Nevertheless, sodium compounds make up 2.8 percent of the earth's crust. Most sodium salts are extremely soluble in water. Because of this, any sodium that is leached from soil or discharged into streams by industries will normally remain in solution. Sodium is the cation of many salts used in industry and is one of the most common ions in process wastes.

Sodium in drinking water may be harmful to people suffering from cardiac, renal, and circulatory diseases. Drinking water of good quality may contain up to 115 mg/l of sodium, but it is recommended that a limit of 10 mg/l be established for drinking water and 50 mg/l for industrial water. Water used by livestock and wildlife should not have sodium concentrations greater than 2,000 mg/l.

"Of the United States' waters supporting a good fish fauna, originally the concentration of sodium plus potassium is less than 6 mg/l in about 5 percent, less than 10 mg/l in about 50 percent, and less than 85 mg/l in about 95 percent."[18]

SPECIFIC CONDUCTANCE

Specific conductance is an indication of the ion concentration in water. Natural freshwater usually contains relatively small amounts of ions in solution, but in water polluted by brines and various chemical wastes the ion concentration may rise to levels that are harmful to living organisms because of the increase in osmotic pressure.

All substances in solution collectively exert osmotic pressure on the organisms living in it. Most aquatic species can tolerate some changes in the amount of ions naturally present if the total maximum concentration is not exceeded. Wide variations in total salinity (specific conductance) or in the concentration of individual salts can have profound effects upon the aquatic fauna, resulting in the elimination of some or all aquatic species. When the osmotic pressure is sufficiently high because of ions in solution (high specific conductance), water will be drawn from the gills and other delicate external tissues causing considerable damage or even death. High concentrations of many types of pollutants of freshwater present this danger apart from any other toxic or corrosive effects they may have.[19]

18/ McKee and Wolf, *op. cit.*, p. 259.

19/ *Ibid.*, p. 94.

"Ellis has concluded that conductances in excess of 1,000 mhos x 10^{-6} at 25 degrees centigrade in most types of streams are probably indicative of the presence of acid or salt pollution of various kinds. Ellis has also found that a specific conductance of 4,000 x 10^{-6} mhos at 25 degrees centigrade is approximately the upper limit of ionizable salts tolerated by fish.

Using Ellis' data, Hart, et al., have reported that among United States' waters supporting a good fish fauna, about 5 percent have a specific conductance under 50 x 10^{-6} mhos at 25 degrees centigrade, about 50 percent under 270 x 10^{-6} mhos, and about 95 percent under 1,100 x 10^{-6} mhos."20/

SULFATE (SO_4)

Sulfate content can be analyzed by the Turbidimetric Method and expressed in mg/l. Sulfates occur naturally in waters as a result of leachings from gypsum and other common minerals. "Sulfate is ecologically important in natural waters in several ways. It is apparently necessary for plant growth; short supply of the material can inhibit the development of phytoplankton populations and, therefore production. Sulfur is important in protein metabolism and is supplied to the organism originally as sulfate."21/ "In U.S. waters that support good game fish populations, 5 percent of the waters contain less than 11 mg/l of sulfates, 50 percent less than 32 mg/l, and 95 percent less than 90 mg/l. Experiments indicate that water containing less than 0.5 mg/l of sulfate will not support growth of algae."22/

SULFIDE (S)

Sulfides are determined by the Methylene Blue Method and expressed in mg/l. Sulfides in water are a result of the natural processes of decomposition, sewage, and industrial wastes such as those from oil refineries, tanneries, pulpmills, papermills, textile mills, chemical plants, and gas manufacturing facilities.

"The toxicity of solutions of sulfides toward fish increase as the pH value is lowered, i.e., the H_2S or HS, rather than the sulfide ion, appears to be the toxicity principle."23/ "Concentrations in the

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20/ Ibid., p. 274.

21/ George K. Reid, op. cit., p. 195.

22/ McKee and Wolf, op. cit., p. 276.

23/ Ibid., p. 277.

range of less than 1.0 mg/l to 25.0 mg/l are lethal in 1 to 3 days to freshwater fish."24/

SUSPENDED SOLIDS

Suspended solids consist normally of sediment, organic detritus, bacteria, and plankton in natural waters. The standard method of determining the suspended solids content of a water source is by use of the Photometric Method which gives a direct reading of mg/l of suspended solids. The test is not intended to measure the concentrations of specific chemical substances in water, but rather give an empirical estimate of water quality by measuring the amount of suspended foreign materials present. Suspended solids may kill some species of fish and shellfish if exposed to concentrations of 100-200 mg/l for long-term periods.25/

TEMPERATURE

Temperature is an important, and sometimes critical water quality parameter. Water temperature changes can result from natural climatic phenomena or from man's activities. For instance, "stream temperatures may be increased by irrigation practices and the return of agricultural drainage."26/

Water temperature changes resulting from man's activities are generally upward. Increases in temperature usually cause some or all of the following: (1) lowers the solubility of dissolved oxygen, thereby reducing the availability of this essential gas, (2) higher temperatures increase the rate of metabolism and respiration and thus the oxygen demand of fish and other aquatic life; therefore, the oxygen demand is increased while the oxygen supply is decreased, (3) intensifies the toxicity of many substances, (4) higher temperatures favor the growth of sewage fungus and the putrefaction of sludge deposits which is detrimental to desirable fishes, (5) there is a maximum and minimum temperature that each species can tolerate; therefore, changes in temperature may cause a change in species' composition; (fish tolerance to temperature extremes and changes vary with fish species, prior acclimatization, oxygen availability, and the synergistic effects of other pollutants) and (6) changes in

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24/ U.S. Department of the Interior, Federal Water Pollution Control Administration, Water Quality Criteria, (Washington: U.S. Government Printing Office, 1972), p. 88.

25/ McKee and Wolf, op. cit., p. 280.

26/ Ibid., p. 283.

temperature also affects lower aquatic life. Temperature is one of the environmental features that determines which organisms will thrive, diminish, or be eliminated.27/

To maintain a well-rounded warm-water fishery population, the following recommendations were made on temperature extremes and temperature increases.

1. "During any month of the year, heat should not be added to a stream in excess of the amount that will raise the temperature of the water (at the expected minimum daily flow for that month) more than 5 degrees Fahrenheit. In lakes and reservoirs, the temperature of the epilimnion should not be raised more than 3 degrees Fahrenheit above that which existed before the addition of heat of artificial origin. The increase should be based on the monthly average of the maximum daily temperature.

2. The normal daily and seasonal temperature variations that were present before the addition of heat, because of other than natural causes, should be maintained.

3. The recommended maximum allowable temperatures are not to exceed the maximum temperatures of the preferred fish species and their associated biota."28/

TOTAL ALKALINITY

Alkalinity is not a specific polluting substance, but rather a combined effect of several substances and conditions. It is actually a measurement of the power of a solution to neutralize hydrogen ions. It is usually expressed in terms of an equivalent amount of calcium carbonate, $CaCO_3$. Alkalinity is caused by the presence of carbonates, bicarbonates, hydroxides, and to a lesser extent by borates, silicates-phosphates, and organic substances. Total alkalinity is related to pH but high pH values do not necessarily mean high total alkalinity values. High total alkalinity values indicate a buffered water which would be resistant to rapid, wide changes in pH. For instance, water with a pH of 7.0 can have a low total alkalinity value, whereas a buffered water with a pH of 6.0 can have a higher total alkalinity value.

Alkalinity itself is not considered harmful to humans but it is usually associated with high pH, hardness, and excessive dissolved solids, all of which may be harmful. For industrial use, high total alkalinity can be either beneficial or detrimental depending upon the type of industry.

27/ Ibid., p. 285.

28/ U.S. Department of the Interior, Federal Water Pollution Control Administration, Water Quality Criteria, (Washington: U.S. Government Printing Office, 1972), p. 42.

Water to be used by livestock and wildlife for drinking should have a total alkalinity below 170 mg/l. Animals drinking water with higher values develop diarrhea. For fish and other aquatic life, alkalinity is not lethal to fully developed fish if the concentration is not enough to raise the pH well above 9.0.

The best waters for supporting a productive, diversified fish population and other aquatic life are those with pH values between 7 and 8 and having a total alkalinity of 120 mg/l or more. This alkalinity acts as a buffer to help prevent sudden changes in pH which could be harmful to fish and other aquatic life.29/

For waterfowl, waters with relatively high bicarbonate alkalinity produce more high value food plants than those with low such values. "Few waters with less than 25 mg/l bicarbonate alkalinity can be classed among the better waterfowl habitat."30/ Bicarbonate increases the amount of CO_2 available for plant use in photosynthesis.

TURBIDITY

Turbidity is the term used to describe the degree of translucence produced in water by suspended particulate matter. Excessive turbidity reduces light penetration into the water and, therfore, reduces photosynthesis by phytoplankton organisms, attached algae, and submersed vegetation. Turbidity calibrations were originally based on the Jackson Candle Turbidimeter with results expressed in Jackson Turbidity Units (JTU). As the Jackson equipment lacks sensitivity below 25 JTU (most treated water ranges from 0 to 5 JTU), the meter scale calibrations have been based on a uniform milky polymer called formazin, which allows accurate calibrations over a wide range. The results are expressed as Formazin Turbidity Units (FTU) and are equivalent to the Jackson Units. According to the Buck "maximum production of 161.5 lbs/acre occurred in farm ponds where the average turbidity was less than 25 FTU. Between 25 and 100 FTU fish yield dropped 41.7 percent to 94 lbs/acre, and in muddy ponds where turbidity exceeded 100 FTU, the yield was only 29.3 lbs/acre, or 18.2 percent of clear ponds."31/

29/ McKee and Wolf, op. cit., p. 129.

30/ U.S. Department of the Interior, Federal Water Pollution Control Administration, Water Quality Criteria, (Washington: U.S. Government Printing Office, 1972), p. 94.

31/ Ibid., p. 46.

APPENDIX E

WATER QUALITY CRITERIA FOR BAYOU PLAQUEMINE BRULE[1/]

GENERAL CRITERIA:

The following general criteria are applicable to the surface waters of the State of Louisiana and specifically apply with respect to substances attributed to waste discharges or the activities of man as opposed to natural phenomena.

Natural waters may, on occasion, have characteristics outside the limits established by these criteria; in which case these criteria do not apply. The criteria adopted herein relate to the condition of water as affected by waste discharges or man's activities.

These general criteria do not supercede specific exceptions to any one or more of the following if the exception is specifically stated in a specific water quality standard. All waters of the state shall be capable of supporting desirable diversified acquatic life.

(1) AESTHETICS - The present and future use of all streams and water bodies considered in these criteria. The waters of the state shall be maintained in an aesthetically attractive condition and shall meet the generally accepted aesthetic qualifications.

(2) COLOR - True color shall not be increased to the extent that it will interfere with present usage and projected future use of the streams and water bodies.

(3) FLOATING, SUSPENDED AND SETTLEABLE SOLIDS - Free from substances that will produce distinctly visible turbidity, solids or scum, nor shall there be any formation of slimes, bottom deposits or sludge banks attributable to waste discharges from municipal, industrial, or other sources including agricultural practices.

1/ State of Louisiana, Louisiana Stream Control Commission, State of Louisiana Water Quality Criteria, 1973. pp. 9-11 and 29.

(4) TASTE AND ODOR	- Taste and odor producing substances shall be limited to concentrations in the waters of the state that will not interfere with the production of potable water by reasonable water treatment methods, or impart unpalatable flavor to food fish, including shellfish, or result in offensive odors arising from the waters, or otherwise interfere with the reasonable use of the waters.
(5) TOXIC SUBSTANCES	- None present in quantities that alone or in combination will be toxic to animal or plant life. In all cases the level shall not exceed the $TLM_{96}/10$. Bioassay techniques will be used evaluating toxicity utilizing methods and species of test organisms suitable to the purpose at hand. In cases where the stream is used as a public water supply the level of toxic substances shall not exceed the levels established by the United States Public Health Service drinking water standards latest edition.
(6) OILS AND GREASES	- There shall be no free or floating oil or grease present in sufficient quantities to interfere with the designated uses, nor shall emulsified oils be present in sufficient quantities to interfere with the designated uses.
(7) FOAMING OR FROTHING MATERIALS	- None of a persistent nature
(8) NUTRIENTS	- The naturally occurring nitrogen-phosphorous ratio shall be maintained. On completion of detailed studies on the naturally occurring levels of the various macro and micro nutrients the state will establish numerical limits on nutrients where possible.

SPECIFIC CRITERIA	WATER USES				CRITERIA						
SEGMENT DESCRIPTION	PRIMARY CONTACT RECREATION	SECONDARY CONTACT RECREATION	PROPAGATION OF FISH AND WILDLIFE	DOMESTIC RAW WATER SUPPLY	CHLORIDE(mg/l) Not to exceed	SULPHATE(mg/l) Not to exceed	DISSOLVED OXYGEN (mg/l) Not less than	pH RANGE	Bacteria Standard	TEMPERATURE ^{o}C	TOTAL DISSOLVED SOLIDS (mg/l) Not to exceed
Bayou Plaquemine Brule - Headwaters to Bayou Des Cannes		X	X		90	30	5.0	6.0 to 8.5	2	32	260

APPENDIX F

TOXICITIES OF SELECTED PESTICIDES

Actual hazards or damages caused from pesticides depend upon a large number of complex and interrelated factors of which volumes applied and acreages covered are only a small part. Some of the other factors which must be considered in evaluating the hazards of a pesticide are as follows:

1. Type of chemical or chemicals used and its mode of entry and its acute and chronic toxicity to different species.

2. Influence of impurities, wetting agents, solvents, diluents, activators, and other ancillary chemicals.

3. Method of application: high or low volume spraying, mist blowing, dusting, soil treatment, seed treatment, or bait treatment.

4. Concentration at which the chemical is applied.

5. The peristence of the chemical.

6. Effect on animal food sources: does it make them more or less attractive to the animals?

7. Numbers and species of animals present in the treated area and their respective sensitivity to the chemical or chemicals used.

8. Feeding, drinking, and behavioral habits of the animal species present.

9. Age, weight, and food consumption of the species present at time of treatment.

10. Movement in reaction to treatment by species present.

11. Number and kind of features in the area to be treated that would attract and/or hold animal life in the area (nesting cover, escape cover, food, or water.)

12. Climate, season, and weather conditions - these factors will influence the effects of chemicals effect on animal life as well as on the chemicals themselves.

TOXICITIES

A detailed description of how the above factors affect the hazards of pesticides can be found in the publication by the California Department of Fish and Game, Pesticides: Their Use and Toxicity in Relation to Wildlife, by Robert L. Rudd and Richard E. Genelly.

The usual way of expressing acute toxicity of pesticides is by means of an LD_{50} value. The LD_{50} (median lethal dosage) is a statistical estimate of the dosage that would be fatal to 50 percent of a large population of the test species. How the LD_{50} figures are used is largely a matter for the reader to decide, but a word of caution is given to regard them only as guides or benchmarks. They are truly meaningful only in the context of the above factors.

ALDRIN

Aldrin is the common name of a chlorinated hydrocarbon insecticide. It is crystaline, insoluble in water, slightly soluble in oils, and soluble in most other organic solvents. It has moderate residual action. It has a very high degree of cumulative action, even for a chlorinated hydrocarbon.1/ It is usually applied at rates of one-quarter to one-half pound per acre.

Aldrin has a moderately high acute and chronic effect by all routes of entry. It has been estimated that the fatal dose for a 70-kg man is 5 grams. For rats the acute oral LD_{50} varies from 10 mg/kg to 60 mg/kg. Dogs are about five times more susceptible to aldrin than rats. Sheep and cattle fed alfalfa treated at 0.5 lbs/ac showed no noticeable reactions.2/ Birds are quite susceptible to aldrin. "Ducks and other waterfowl suffered significant losses from single applications of aldrin as low as 0.125 lb/ac. Feeding of 1 mg/kg in the diet of quail caused a decrease of 40 percent reproduction, and when fed to growing quail caused high mortality rates."3/ Aldrin is highly toxic to fish. "Exposure of fingerling trout to a concentration of 0.033 ppm resulted in 100 percent mortality.4/

1/ Richard K. Tucker and Glen D. Crabreee, Handbook of Toxicity of Pesticides to Wildlife (Washington: U.S. Government Printing Office, 1970), pp. 16-17.

2/ Jack E. McKee and Harold W. Wolf, Water Quality Criteria, Publication No. 3-A (2nd ed.; Sacramento: State Water Quality Control Board, 1963), p. 357.

3/ Ibid.

4/ Robert L. Rudd and Richard E. Genelly, Pesticides: Their Use and Toxicity in Relation to Wildlife, Game Bulletin No. 7, 1956, p. 55.

TOXICITIES

A review of the literature reveals the following acute oral toxicity levels of aldrin to animals

ANIMAL	LD_{50}	
Human	70 mg/kg	(of body wt.)
Rat	10-60 mg/kg	"
Rabbit	15-22 mg/kg	"
Mallard	520 mg/kg	"
Bobwhite quail	7 mg/kg	"
Dove	15-17 mg/kg	"
Pheasant	17 mg/kg	"
Fulvous tree duck	30 mg/kg	"
Bluegill	0.01 mg/l	
Goldfish	0.03 mg/l	

BHC

(Benzene Hexachloride)

BHC (benzene hexachloride) is a widely used chlorinated hydrocarbon insecticide also known as Lindane. Of its nine possible stereoisomers, the gamma isomer has the most powerful insecticidal properties. BHC has a residual life in the soil about like that of DDT. Crops grown in soils containing lindane absorb the insecticide into their tissues. Also, irrigation water containing BHC will taint the flavor of crops with a characteristic musty odor and taste. BHC has no effect on soil pH or on its bacterial content.[5/]

The chronic toxicity of BHC, with the exception of the beta isomer, is relatively low. BHC has been rated as one-half the toxicity of DDT. Criteria used in deriving this rating were minimal storage, rapid elimination from the body, and lesser degree of tissue damage.[6/] It does have a high cumulative toxic action, even for a chlorinated hydrocarbon.[7/]

The chronic oral toxicity of BHC to rats for a 2-year period was found to be 5.0 mg/kg of body weight per day. The amount of BHC required to produce at least 50 percent mortality, considering all stages of the life cycle, in bobwhite quail and ringneck pheasant

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5/ McKee and Wolf, op. cit., p. 361.

6/ Rudd and Genelly, op. cit., p. 57.

7/ Tucker and Crabtree, op. cit., p. 76.

populations are 250 and 450 mg/kg (of body weight), respectively. Five applications per year of BHC applied during the summer for 3 consecutive years at a rate of 1 pound per acre each time (about 0.1 mg/l) resulted in no fish mortalities. Dust of 3 percent gamma BHC applied at 1 lb/ac/week for 20 consecutive weeks caused only minor fish mortalities. One lb/ac of wetable powder BHC was reported to have caused high fish mortalities in a small pond. An aerial application of 0.2 lb/ac BHC caused heavy losses of fiddler and marsh crabs.[8/]

Some representative acute oral toxicity values for selected animals were taken from a literature review and are presented in the following tabulation.

ANIMAL	LD_{50}
Human	215 mg/kg (of body wt.)
Rat	90-400 mg/kg "
Bobwhite quail	120-190 mg/kg "
Ringneck pheasant	60-100 mg/kg "
Mourning dove	350-400 mg/kg "
Bluegill (fingerlings)	0.1 mg/l
Bass "	0.1 mg/l
Crab	6.5 mg/l
Copepod	0.1 mg/l

CAPTAN

Captan is the approved common name of a fungicide formerly known as SR-406, Vancide 89, and Orthocide. It is an insoluble crystal product which is partially soluble in some organic solvents.

Captan is practically nontoxic to animals. Rats fed 1,000 mg/kg in the diet for 1 year showed no differences from controls. Captan is readily hydrolyzed and the effective residual life of it is only 2 weeks. The acute oral toxicity LD_{50} for rats is 15,000 mg/kg and for rabbits 3,160 mg/kg.[9/]

CARBARYL

(Sevin Moly)

Sevin is an insecticide in the carbamates group. It is slightly soluble in water and most organic solvents, but freely soluble in

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8/ McKee and Wolf, op. cit., p. 362.

9/ Ibid.

amides such as demethyl-formamide. It is usually used as an insecticide but it has a low mammalian toxicity. Over 40 gms/kg of Sevin is required to produce a 50-percent mortality in ringneck pheasants considering all stages of their life cycle. "Sevin applied at a rate of 1.25 lb/ac in fuel oil with a paraffin oil sticker effected reductions in weight of invertebrate fish food of 48.9 to 97.2 percent. On one stream, little recovery was observed up to 1 month later. However, no fish mortality was noted."[10/]

Acute oral toxicity values of Sevin toward various animal species are as follows:

ANIMAL	LD_{50}
Rat	390-750 mg/kg (of body wt.)
Cat	125-250 mg/kg "
Dog	250-795 mg/kg "
Rabbit	710 mg/kg "
Mule Deer	200-400 mg/kg "
Crayfish	.5 mg/1
Bluegill	6 mg/1
Mosquitofish	2 mg/1
Channel catfish	12 mg/1
Bullfrog tadpole	5 mg/1
Gold fish	4 mg/1

CARBOFURAN

(Furadan)

Furadan (carbofuran) is a pesticide in the group known as carbamates. This is a relatively new pesticide which is used mostly to control insects, mites, and nematodes. It is not as persistent as the organochlorine group and there is almost no cumulative toxicity. However, Furadan is extremely toxic and fast acting. In toxicity tests, mortalities occured as rapid as 5 minutes after treatment. Symptoms produced in survivors of lower concentration tests persisted for up to 7 days. As little as 2 ppm Furadan in the drinking water of fulvous tree duck was fatal after 7 days of exposure, and as little as 1 ppm caused symptoms of intoxication.[11/]

10/ McKee and Wolf, op. cit., p. 387.

11/ Tucker and Crabtree, op. cit., p. 65.

Furadan is relatively new and only a limited amount of data is available on its toxicity. A review of the literature revealed the following acute oral toxicity levels to different animals.

ANIMAL	LD_{50}	
Bobwhite quail	4-7 mg/kg	(of body wt.)
Fulvous tree duck	.3 mg/kg	"
Duck (mallard)	.3-.5 mg/kg	"
Pheasant	2-7 mg/kg	"
Crawfish	.5 mg/l	
Bluegill	.08 mg/l	
Mosquitofish	.3 mg/l	
Channel catfish	2 mg/l	
Bullfrog tadpole	3 mg/l	

DDD

(TDE)

DDD is a chlorinated hydrocarbon insecticide also known as TDE and Rhothane. It is closely related to and used in much the same way as DDT. Chemically, it has one less chlorine atom and one more hydrogen atom than DDT. It is slightly soluble in water, has low solubility in oils, and is freely soluble in most other organic solvents. It is formulated as dusts, wettable powders, and emulsifiable concentrates which are applied at slightly higher rates than DDT.

DDD's chief value is its high toxicity to insects -- approximately that of DDT -- combined with its low mammalian toxicity -- about one-fifth that of DDT. "In general, DDD is one third as toxic as DDT, in chronic feeding, one quarter as toxic by skin absorption and is 'considerably' less toxic than DDT when the dust is inhaled."12/

Domestic animals can be treated with DDD with comparative safety. However, calves are particularly sensitive. The major field usage in which a wildlife hazard exists is in mosquito control. However, properly applied DDD should cause only slight damage to fish and fish food organisms. When applied at the rate of 0.022 ppm, DDD causes a drastic temporary reduction of some fish food organisms and some losses of fish. DDD is not considered toxic to bobwhite quail in amounts usually used in the field. In one experiment, DDD was applied to the ground and foliage in quail pens at the rate of 5 pounds per acre and no mortalities resulted.13/

12/ Rudd and Genelly, op. cit., p. 61.

13/ Rudd and Genelly, op. cit., p. 62.

TOXICITIES

Acute oral toxicity of DDD to animals is given in the following tabulation.

ANIMAL	LD_{50}
Rat	3400 mg/kg (of body wt.)
Dog	80 mg/kg "
Channel catfish	2.6 mg/l
Bluegill	.2 mg/l
Goldfish	2.0 mg/l

DDT

The sale of DDT has been banned in the United States since January 1973. This insecticide is so well known and formerly widely used both inside and outside agricultural circles, that it is hardly necessary to characterize it. It has a low volatility, very high residual power, high cumulative toxicity, and high disposition rates in animal tissues. These are the major reasons this insecticide was removed from the market.

DDT is especially stable in soil with decomposition being about 5 percent per year, dependent upon soil types. Some plants such as squash, cucumber, tomatoes, strawberries, peas, and beans are retarded by DDT levels of 25 lbs/ac. Also, crops grown in soils treated with DDT will absorb it into their tissues.[14/]

The following are some general statements on DDT's toxicity to animals. The diluent and/or solvent is very important in determining its toxicity. When fed a dietary level of 5 mg/kg, rats developed a detectable amount of liver damage. An oral application of DDT at 5 lbs/ac is required in order to produce direct mortality in mammals. Indirect effects, however, are noted at applications as low as 0.5 lb/ac. Too much DDT is required to produce symptoms for it to be directly harmful to domestic livestock. Nonetheless, it is very possible that meat and milk will be contaminated if DDT is used around livestock. Cattle seem to react more strongly to it than horses or sheep. "It has been suggested that the so-called X-disease in cattle is actually DDT poisoning."[15/]

In general, birds are not as sensitive to the direct effects of DDT as mammals. At ordinary application rates, there is not enough DDT present from one treatment to cause deaths in birds.

14/ McKee and Wolf, op. cit., p. 368.

15/ Rudd and Genelly, op. cit., p. 65.

The same cannot be said for multiple exposures. Also, even though more resistant than mammals, chronic poisoning of birds is possible at rates often used in the field. The effect of 5 lbs/ac on birds, however, is not gradual since this level reduced the Maryland yellow-throat by 63 percent in 24 hours and the prairie warbler by 93 percent in 48 hours.

At usual application rates, reptiles and amphibians are not seriously affected. Rates in excess of 3 lbs/ac will cause losses. The oil solvent seems to be more toxic or damaging to reptiles and amphibians than the DDT itself at treatment rates below 3 lbs/ac.

Most aquatic organisms are more susceptible to DDT than terrestrial forms. When applied in flowing streams, the effects of DDT are persistent and widespread. Simulium arcticum were controlled 40-98 miles downstream from a single treatment of 0.09 mg/l for 16 minutes. Earthen ponds treated with 0.4 mg/l wettable powder may remain toxic to fish for several months. Crabs, crayfish, and amphipods are reported to be more sensitive to DDT than fish. Also, the presence of aquatic vegetation reduces the toxicity of DDT to fish while the plants themselves are not harmed.[16/]

Because of the many environmental variables, there are wide variations in the concentrations of DDT lethal to animals reported in the literature as illustrated in the following tabulation.

ANIMAL	ACUTE ORAL LD_{50}
Human	430 mg/kg (of body wt.)
Rat	250 mg/kg "
Dog	750 mg/kg "
Cat	285 mg/kg "
Rabbit	300 mg/kg "
Pheasant	1,295 mg/kg "
Bobwhite quail	250 mg/kg (of diet)
Starling	600 mg/kg (of body wt.)
Bluegill	.007 mg/l
Mosquitofish	.03 mg/l
Channel catfish	.04 mg/l
Crawfish	.03 mg/l
Bullfrog tadpole	.30 mg/l

DIELDRIN

Dieldrin is the assigned common name for a chlorinated hydrocarbon insecticide. It is insoluble in water and moderately soluble in

16/ McKee and Wolf, op. cit., p. 369.

most organic solvents. It may be formulated as emulsifiable concentrate, dust, wettable powder, and granular. It has a long residual action and a high degree of cumulative action. Mortalities from dieldrin usually occur 1 to 9 days after exposure.17/ "Dermal toxicity is relatively high. The dermal LD_{50} for rabbits is less than 150 mg/kg. No warning skin irritation appears. The cumulative toxic level for dermal exposure must be much less than 5 mg/kg."18/ Also, acute and chronic oral toxicities are high.

"In describing several cases of dieldrin intoxication, it was concluded that contamination of water even with small quantities (of dieldrin) is very dangerous." Rats can survive for over a year on water containing 0.2 mg/l of dieldrin which would be fatal to fish in a few hours.19/

The application of dieldrin at 3 lbs/ac will cause the most wildlife losses the week following application. At this rate (3 lbs/ac) it will cause very high wildlife losses. "Ducks, pheasants, and wading birds were killed when dieldrin was applied at 0.5 lbs/ac. No ill effects were noted when quail were fed winter diets containing 1 mg/kg. The amount of reproduction decrease in quails caused by 1 mg/kg of dieldrin in the diet has been noted as 40 percent. The amount of dieldrin that will produce at least 50 percent mortalities in bobwhite quail and ringneck pheasant considering all stages of the life cycle in mg/kg, respectively, are 35 and 50."20/

Dieldrin is also highly toxic to fish. In general, it is five times as toxic as DDT, twice as toxic as aldrin, but only one third as toxic as toxaphene and one-twentieth as toxic as endrin to fishes. The report states that an application of 1 lb/ac. of dieldrin will continue to kill aquatic beetles for at least 10 months which indicates rather lengthly toxicity persistance for a pesticide in an aquatic environment. "In landlocked ponds, treatments with dieldrin emulsion at a rate of 1 pound of dieldrin per acre is an efficient larvicide but is totally destructive to fish. An application of 1 pound per acre controlled mosquito larvae for 62 to 78 weeks, but this concentration was decidely harmful to fish and other aquatic organisms. Runoff from an area treated with 4.66 pounds per acre was found by fish bioassay to contain 0.13 mg/l (Dieldrin); by chemical determination 0.10 mg/l."21/

17/ Tucker and Crabtree, op. cit., p. 47.

18/ Rudd and Genelly, op. cit., p. 86.

19/ McKee and Wolf, op. cit., p. 372.

20/ McKee and Wolf, op. cit., p. 373.

21/ Rudd and Genelly, op. cit., p. 86.

TOXICITIES

A large number of reported acute oral toxicities have been found in the literature. These are summarized as follows.

ANIMAL	LD_{50}	
Human	70 mg/kg	(of body wt.)
Rat	37-87 mg/kg	"
Goat	100-200 mg/kg	"
Mule deer	75-150 mg/kg	"
Bobwhite quail	12-14 mg/kg	"
Mourning dove	45-50 mg/kg	"
Pheasant	35-190 mg/kg	"
Mallard	350-450 mg/kg	"
Pigeon	20-35 mg/kg	"
House sparrow	35-65 mg/kg	"
Canada geese	50-150 mg/kg	"
Fulvous tree duck	100-200 mg/kg	"
Bass	0.006 mg/l	
Bluegill	0.01 mg/l	
Golden shiner	0.04 mg/l	
Goldfish	0.24 mg/l	

METHYL PARATHION

Methyl Parathion is an organophosphorus insecticide. It is effective in controlling many species of insects, but its chief advantage in use is its striking toxicity to aphids, scale insects, and mites. These insects are not easily controlled with chlorinated insecticides. It is used most often on row crops, but it may be used on others. Parathion is available as a dust, wettable powder, and as emulsifiable concentrate. The first two formulations contain 2 percent or less actual parathion and are less hazardous.

Chronic hazards from parathion seem slight. Not only do residues disappear quickly, but there seems to be little cumulative action. "The half-life of methyl parathion on cotton leaves is less than 1 hour."[22/] "Rats fed diets containing parathion up to 100 ppm showed normal weight gains, survival, and food consumption. There was no detectable storage in tissue."[23/]

The estimated fatal dose of methyl parathion for a 70 kg man is 0.15 grams. Oral intake is not particularly hazardous in agricultural practice. Skin and respiratory exposure is far more serious. A great

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22/ McKee and Wolf, *op. cit.*, p. 380.

23/ Rudd and Genelly, *op. cit.*, p. 109.

many human beings have become ill from exposure to parathion and several fatalities have been described.

Cattle fed alfalfa contaminated at values of 14 mg/kg of alfalfa showed no adverse effects. As little as 1 mg/kg of body weight in the diet of dogs caused symptoms. Parathion used at the rate of 0.05 lbs/ac for mosquito larvae control had no ill effects to mammals or birds but killed frogs. Concentrations of 0.5 and 1.0 mg/l applied for 5 minutes eliminated all black-fly larvae in a 1.6-mile stretch of slowly moving water. A 24-minute application failed to control the larvae in an area 2 to 3 miles downstream. Generally speaking, parathion is not highly hazardous to fish. It is many times less toxic to them than most chlorinated hydrocarbon insecticides.[24/]

A review of the literature revealed the following acute oral toxicity levels of parathion to animals.

ANIMAL	LD_{50}	
Human	3 mg/kg	(of body wt.)
Rat	9-25 mg/kg	"
Goat	30-50 mg/kg	"
Rabbit	40-50 mg/kg	"
Steer	75 mg/kg	"
Calf	1.5 mg/kg	"
Sheep	20 mg/kg	"
Ducks (Mallard)	6-16 mg/kg	"
Pheasant	6-12 mg/kg	"
Crawfish	.003 mg/kg	
Bluegill	2 mg/l	
Mosquitofish	.005 mg/l	
Channel catfish	9 mg/l	
Bullfrog tadpoles	6 mg/l	
Goldfish	1.5 mg/l	
Brine shrimp	0.4 mg/l	
Flathead minnow	8 mg/l	

"A concluding test that expresses no finite values may be worth citing. Goldfish and Japanese killifish kept 1 month in a concentration of one-thirtieth of the 48-hour TL_{50} experienced retarded growth and consumed less food. The study concludes that the arbitrary concentration of one-tenth the 48-hour TL_{50} sometimes used as a limiting value is too toxic."[25/]

24/ McKee and Wolf, op. cit., p. 382.

25/ McKee and Wolf, op. cit., p. 357.

TOXAPHENE

Toxaphene is a chlorinated hydrocarbon insecticide which has an acute oral dose toxicity roughly four times as toxic as DDT. It is second only to endrin among the chlorinated hydrocarbons in its toxicity to fish. Because of its very high toxicity to fish, drifting sprays and dust are hazardous near water courses. Dermal toxicity is relatively low in the dry form. It is five or six times more dermal toxic in the liquid form. It is a fairly slow-acting chemical. While symptoms may develop as soon as 20 minutes after exposure, mortalities usually take from 2 to 14 days. Toxaphene is persistent in the environment and cumulative toxic effects occur, but they are not as severe as those of DDT. Toxaphene deposition in tissues is one-quarter to one-eighth of the amount ingested.26/

Lakes treated with Toxaphene to eradicate fish have remained toxic for 3 to 4 years. It appears that the breakdown in toxicity is much more rapid in highly turbid lakes. Also, hard water detoxifies Toxaphene more rapidly than soft water. In one study "ducks and other waterfowl suffered significant losses from a single spraying at the rate of 1.5 lb/ac."27/ "Three of six mourning doves died after consuming food treated at rates recommended for cotton insects control." Ninety percent mortality within 32 days was induced in a bobwhite quail population by feeding them food which contained 0.05 percent Toxaphene."28/ In a test to determine the effects of Toxaphene on the pheasant reproduction the following was found. "Considering the control as 100 percent, reproductive success for the season was 89 percent at 100 ppm in the diet and 65 percent at 300 ppm."29/

"Toxaphene at a concentration of 5 mg/l can reduce the population of small fish in hardwater lakes without greatly affecting the population of larger fish."30/

Acute oral toxicity values of Toxaphene to various animals were obtained from the literature and are listed on the following page.

26/ Rudd and Genelly, op. cit., p. 98.

27/ McKee and Woolf, op. cit., p. 390.

28/ Rudd and Genelly, op. cit., p. 101.

29/ Ibid.

30/ McKee and Woolf, op. cit., p. 391.

TOXICITIES

ANIMAL	LD_{50}
Human	60 mg/kg (of body wt.)
Rat	70-90 mg/kg "
Cattle	145 mg/kg "
Dog	20-30 mg/kg "
Ringneck Pheasant	40-90 mg/kg "
Mule deer	140-240 mg/kg "
Mallard	38-133 mg/kg "
Bobwhite quail	60-123 mg/kg "
Mourning dove	200-250 mg/kg "
Bluegill	.004 mg/l
Mosquitofish	.01 mg/l
Channel catfish	.02 mg/l
Goldfish	.005 mg/l
Bullfrog tadpole	0.3 mg/l

HERBICIDES

(General)

Nearly all herbicides are potentially dangerous in one way or another, but they are not likely to cause injury if they are used properly and if recommended precautions are observed. Several kinds of dangers are associated with handling and application of herbicides. Any or all of the following may be affected: operator and handler, livestock, desirable plants, equipment, and fish and wildlife. Only general effects to fish and wildlife will be discussed here.

Herbicides may have primary and/or secondary effects on fish and wildlife. Primary effects are due to the direct toxicological and physiological action. In general, primary effects of herbicides on fish and wildlife have not been serious. This is because of the low toxicity of most herbicides. For instance, the LD_{50} for rats is 300 to 1,000 mg/kg and 700 to 1,800 mg/kg for MSMA.[31/]

All herbicides have the potential of exerting major secondary effects on fish and wildlife through ecological changes. For instance, herbicides used to eliminate or reduce certain plant species encourage the increase of others. These ecological changes in the habitat may well cause increases or decreases, depending upon species, in wildlife populations. Other effects are toxicity from sublethal doses, changes in palatability of poisonous plants, changes in the chemical composition of plants and loss or reduction of food and cover. Improper application

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31/ U.S. Department of Defense, Herbicide Manual for Noncropland Weeds. Washington: U.S. Government Printing Office, 1970, pp. 7-12.

of herbicides can alter or destroy fish and wildlife food sources and cover, but used wisely, they can be very useful in wildlife management. Openings in forest land and rights-of-way, which are beneficial to wildlife, can be easily maintained with proper herbicide use. Also, they can be used to control unwanted aquatic weeds which is often beneficial to fish population. Safe amounts of herbicides vary with water quality, age, size, and species of fish. It would be wise to consult with Federal or State fish and wildlife services for advice when a proposed treatment program might endanger fish and wildlife.

APPENDIX G - FIGURES

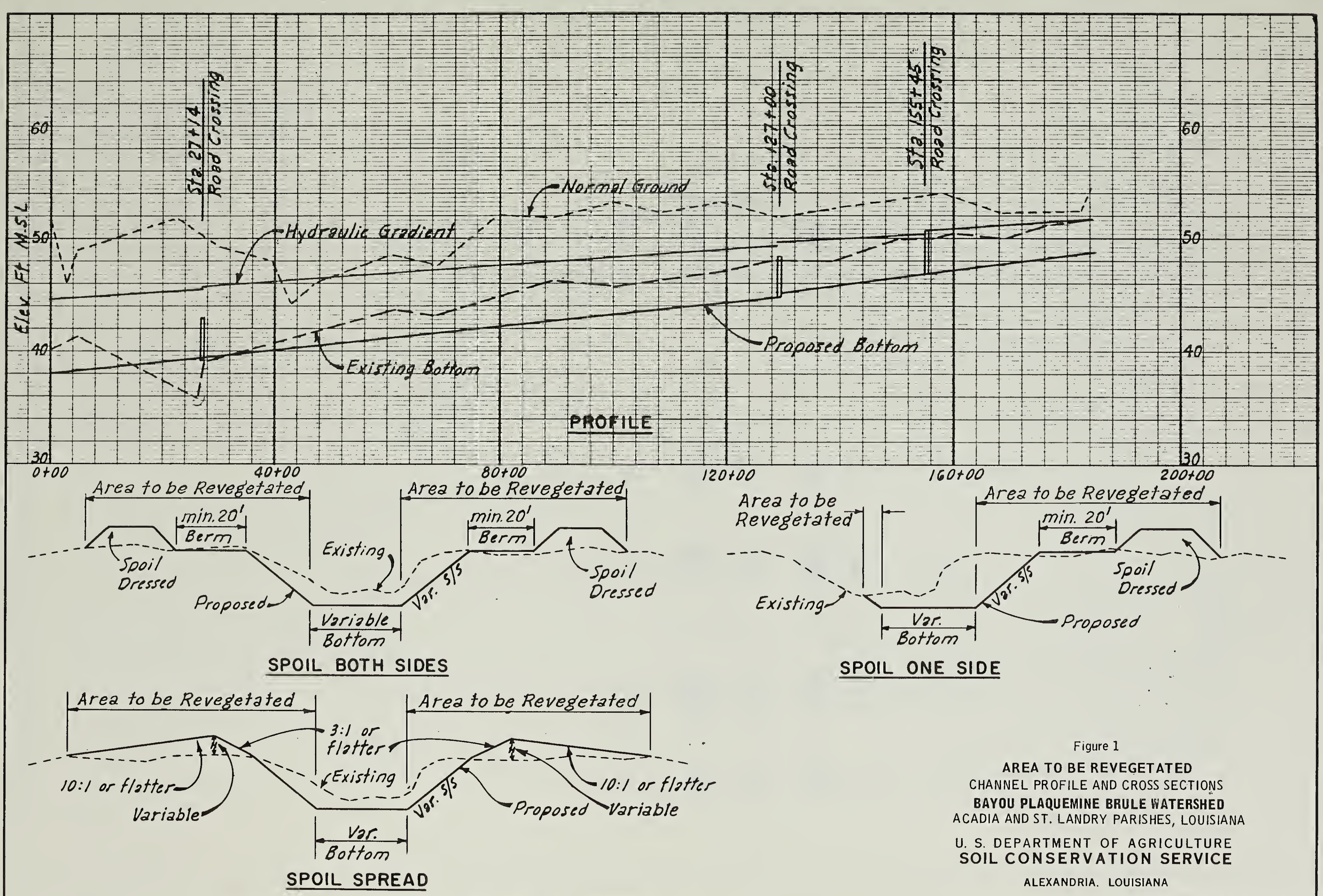


Figure 1

AREA TO BE REVEGETATED

CHANNEL PROFILE AND CROSS SECTIONS

BAYOU PLAQUEMINE BRULE WATERSHED

ACADIA AND ST. LANDRY PARISHES, LOUISIANA

U. S. DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

ALEXANDRIA, LOUISIANA

SEPTEMBER 1974 4–R–34,323

USDA-SCS-FORT WORTH, TEX. 1974

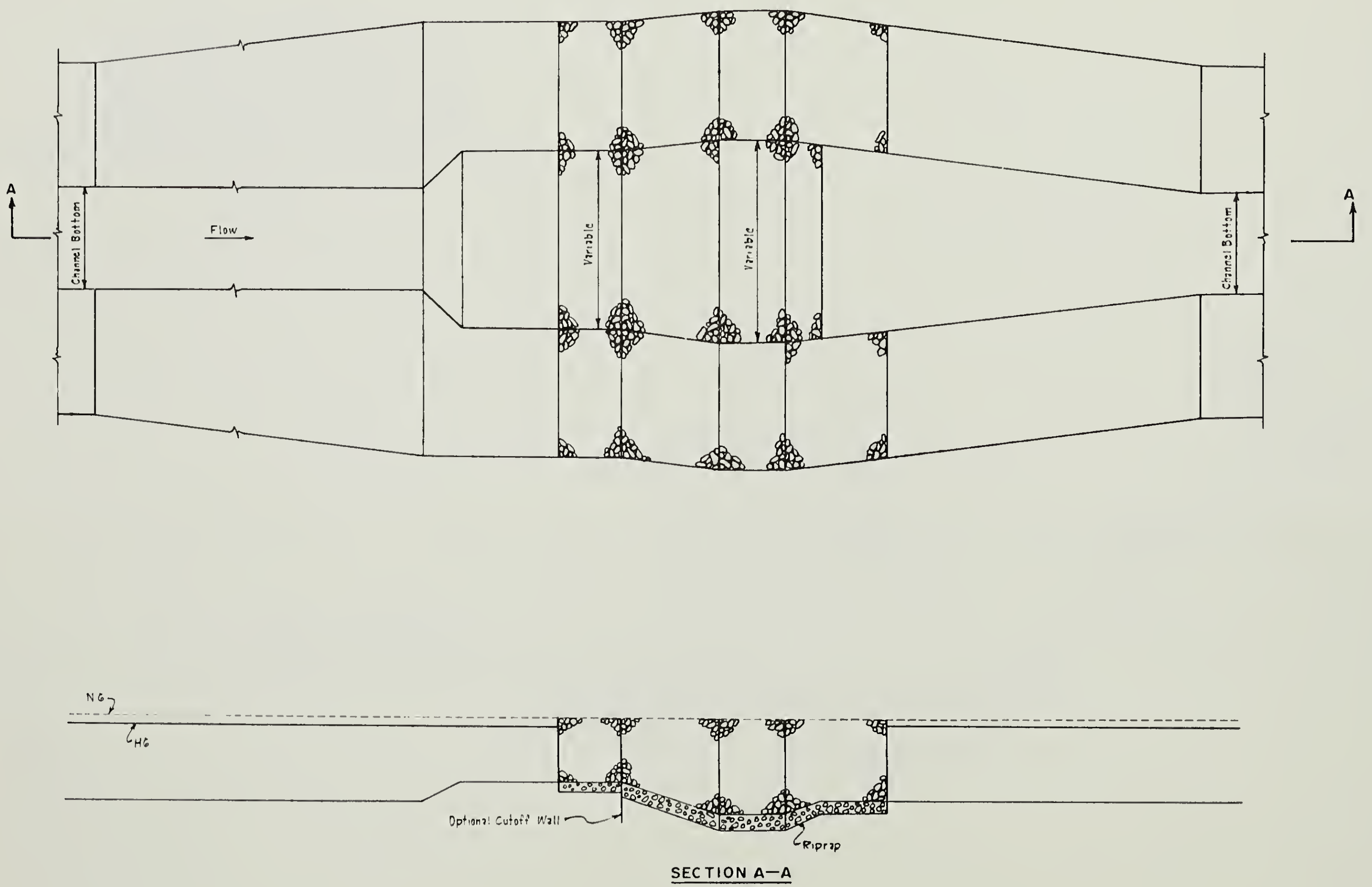


Figure 2

STRUCTURE FOR WATER CONTROL (WEIR)

BAYOU PLAQUEMINE BRULE WATERSHED

ACADIA AND ST. LANDRY PARISHES, LOUISIANA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
ALEXANDRIA LOUISIANA

MARCH 1974 4—R—33803

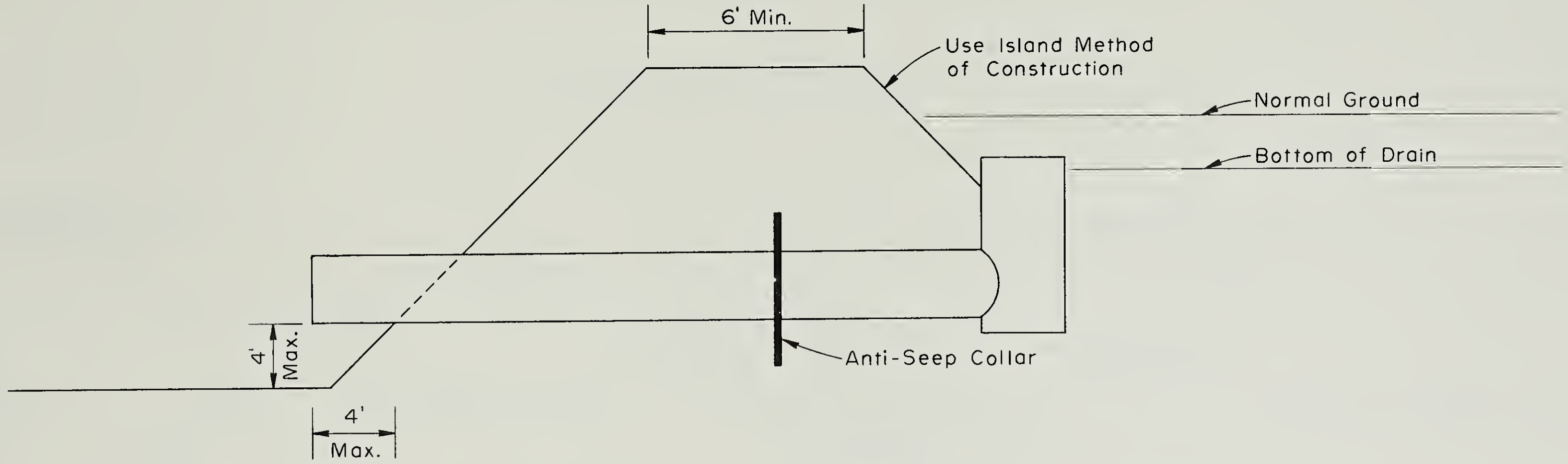
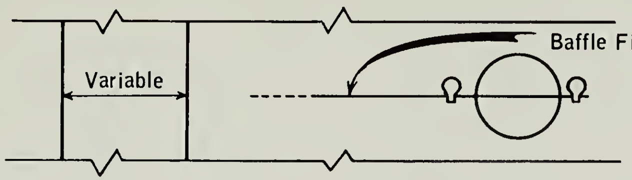


Figure 3

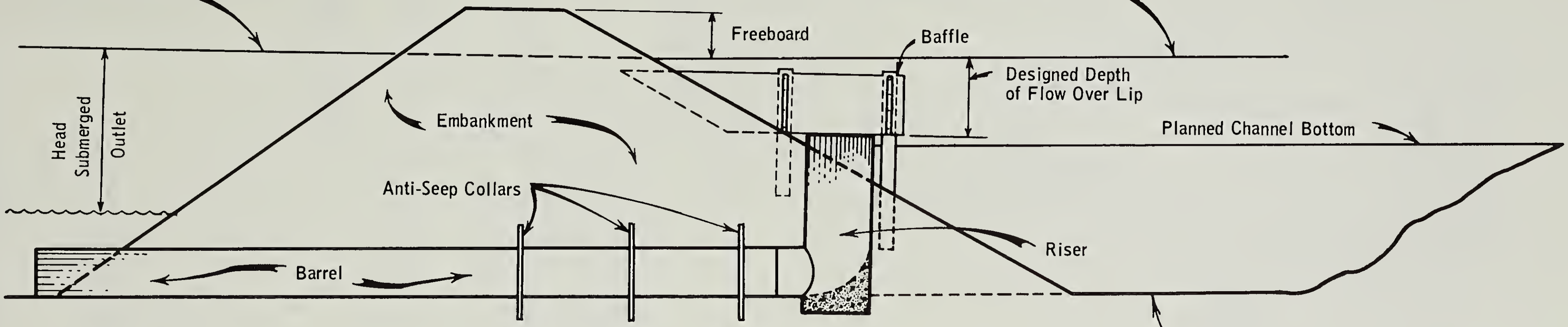
TYPICAL STRUCTURE FOR WATER CONTROL (PIPE DROP)
BAYOU PLAQUEMINE BRULE WATERSHED
ACADIA AND ST. LANDRY PARISHES, LOUISIANA
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
ALEXANDRIA, LOUISIANA

MARCH 1974 4–R–33804

USDA-SCS-FORT WORTH, TEX. 1974



PLAN VIEW OF BAFFLE AND RISER



SECTION VIEW

Figure 4
TYPICAL GRADE STABILIZATION STRUCTURE
BAYOU PLAQUEMINE BRULE WATERSHED
ACADIA AND ST. LANDRY PARISHES, LOUISIANA
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
ALEXANDRIA, LOUISIANA 7-74 4-R-34,153

USDA SCS FORT WORTH TEX 1974

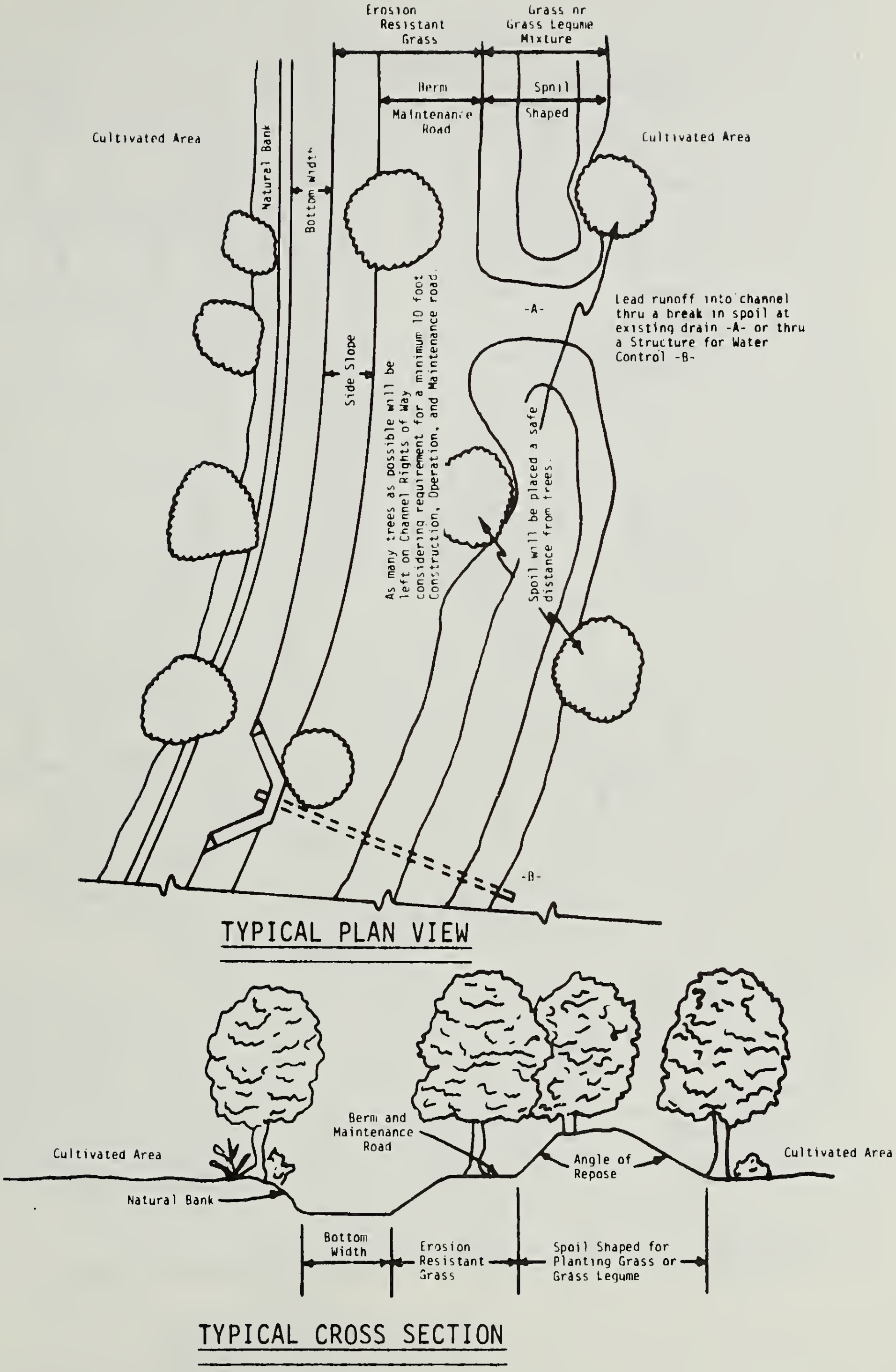


FIGURE 5

BAYOU PLAQUEMINE BRULE WATERSHED

Acadia and St. Landry Parishes, La.

TYPICAL PLAN VIEW AND CROSS SECTION OF CHANNELS WHERE WOODY VEGETATION EXISTS ADJACENT TO CULTIVATED AREA

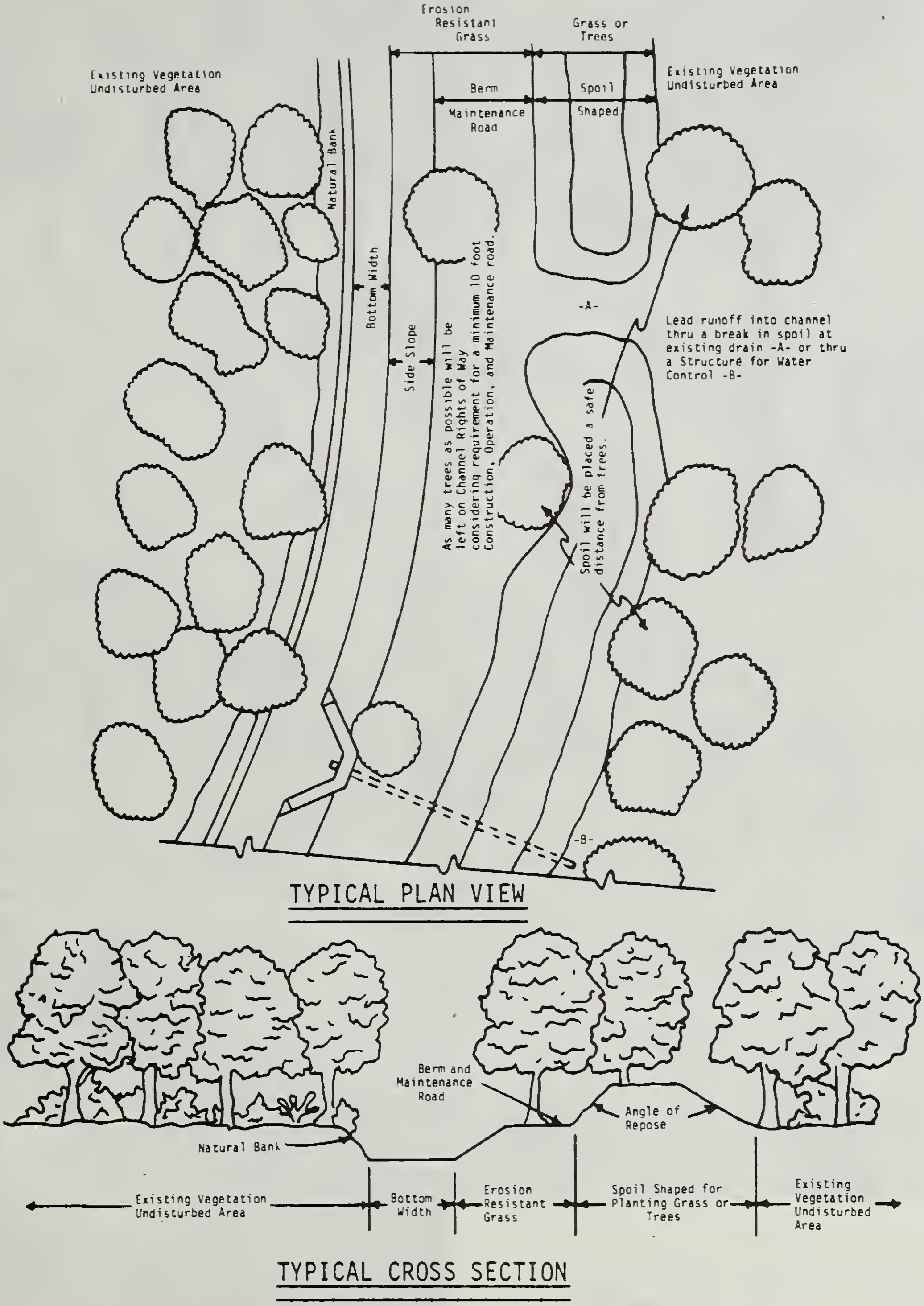


FIGURE 6

BAYOU PLAQUEMINE BRULE WATERSHED

Acadia and St. Landry Parishes, La.

TYPICAL PLAN VIEW AND CROSS SECTION OF CHANNELS THROUGH FOREST LAND

Figure 7

Bayou Plaquemine Brule Watershed
Urban Flood Plain
Town of Church Point
Acadia Parish, Louisiana
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
ALEXANDRIA, LOUISIANA

7-74 4-R-34,135

APPENDIX H

COMMON AND SCIENTIFIC NAMES OF PLANTS

AND ANIMALS MENTIONED IN THIS

ENVIRONMENTAL IMPACT STATEMENT

The animals are listed alphabetically by the common name followed by the scientific name.

MAMMALS

Bobcat
Lynx rufus

Cotton rat
Sigmodon hispidus

Cottontail rabbit
Sylvilagus floridanus

Coyote
Canis latrans

Fox squirrel
Sciurus niger

Gray fox
Urocyon cinereoargenteus

Gray squirrel
Sciurus carolinensis

Mink
Mustela vison

Muskrat
Ondatra zibethicus

Nine-banded armadillo
Dasypus novemcinctus

Nutria
Myocastor coypus

Opossum
Didelphis virginiana

Raccoon
Procyon lotor

Red bat
Lasiurus borealis

Red fox
Vulpes vulpes

Short-tail shrew
Blarina brevicauda

Striped skunk
Mephitis mephitis

Swamp rabbit
Sylvilagus aquaticus

White-footed mouse
Peromyscus leucopus

White-tailed deer
Odocoileus virginianus

BIRDS

Bachman's warbler
Vermivora bachmanii

Barred owl
Strix varia

Belted kingfisher
Megaceryle alcyon

Blue jay
Cyanocitta cristata

Blue-winged teal
Anas discors

Blue goose
Chen caerulescens

Bobwhite quail
Colinus virginianus

Brown thrasher
Toxostoma rufum

Cardinal
Richmondena cardinalis

Carolina wren
Thryothorus ludovicianus

Common crow
Corvus brachyrhynchos

Common egret
Casmerodius albus

Common snipe
Capella gallinago

Downy woodpecker
Dendrocopos pubescens

Eastern bluebird
Sialia sialis

Eastern meadowlark
Sturnella magna

Eastern mockingbird
Mimus polglottos

Fulvous tree-duck
Dendrocygna bicolor

Gadwall
Anas strepera

Green heron
Butorides virescens

Green-winged teal
Anas carolinensis

House sparrow
Passer domesticus

Killdeer
Charadrius vociferus

Little-blue heron
Florida caerulea

Louisiana heron
Hydranassa tricolor

Mallard
Anas platyrhynchos

Marsh hawk
Circus cyaneus

Mottled duck
Anas fulvigula

Mourning dove
Zenaidura macroura

Nighthawk
Chordeiles minor

Pileated woodpecker
Dryocopus pileatus

Pintail
Anas acuta

Red-headed woodpecker
Melanerpes erythrocephalus

Red-shouldered hawk
Buteo lineatus

Red-tailed hawk
Buteo jamaicensis

Robin
Turdus migratorius

Screech owl
Otus asio

Snow goose
Chen hyperborea

Snowy egret
Leucophoyx thula

Southern bald eagle
Haliaeetus leucocephalus

Widgeon
Mareca americana

White-fronted goose
Anser albifrons

White-throated sparrow
Zonotrichia albicollis

Wild turkey
Meleagris gallopavo

Woodcock
Phiohela minor

Wood duck
Aix sponsa

Yellow-billed cuckoo
Coccyzus americanus

REPTILES

American alligator
Alligator mississipiensis

Broad-banded water snake
Natrix sipedon confluens

Canebrake rattlesnake
Crotalus horridus atricaudatus

Common snapping turtle
Chelydra serpentina

Diamond-backed water snake
Natrix rhombifera

Eastern garter snake
Thamnophis sirtalis sirtalis

Eastern hognose snake
Heterodon playrhinos

Five-lined skink
Eumeces fasciatus

Gray rat snake
Elaphe obsoleta spiloides

Green anole
Anolis carolinensis

Ground skink
Lygosoma laterale

Gulf coast box turtle
Terrapene carolina major

Red-eared turtle
Pseudemys scripta elegans

Smooth softshell turtle
Trionyx muticus

Speckled kingsnake
Lampropeltis getulus holbrooki

Southern copperhead
Agkistrodon contortrix contortrix

Southern fence lizard
<u>Sceloporus undulatus undulatus</u>

Stinkpot turtle
<u>Sternothaerus odoratus</u>

Western cottonmouth
<u>Agkistrodon piscivorous leucostoma</u>

Western slender glass lizard
<u>Ophisaurus attenuatus attenuatus</u>

AMPHIBIANS

Bullfrog
<u>Rana catesbeiana</u>

Dwarf salamander
<u>Manculus quadridigitatus</u>

Fowler's toad
<u>Bufo woodhousei fowleri</u>

Marbled salamander
<u>Ambystoma opacum</u>

Southern cricket frog
<u>Acris gryllus gryllus</u>

Southern gray treefrog
<u>Hyla versicolor chrysoscelis</u>

Southern leopard frog
<u>Rana pipiens sphenocephala</u>

Spring peeper
<u>Hyla crucifer</u>

Three-toed amphiuma
<u>Amphiuma means tridactylum</u>

FISHES

Alligator gar
<u>Lepisosteus spatula</u>

Black crappie
<u>Pomoxis nigromaculatus</u>

Blue catfish
<u>Ictalurus furcatus</u>

Bluegill
<u>Lepomis macrochirus</u>

Bowfin
<u>Amia calva</u>

Buffalo
<u>Ictiobus spp.</u>

Carp
<u>Cyprinus carpio</u>

Chain pickerel
<u>Esox niger</u>

Channel catfish
<u>Ictalurus punctatus</u>

Freshwater drum
<u>Aplodinotus grunniens</u>

Gizzard shad
<u>Dorosoma cepedianum</u>

Golden shiner
<u>Notemigonus crysoleucas</u>

Green sunfish
<u>Lepomis cyanellus</u>

Largemouth bass
<u>Micropterus salmoides</u>

Pirate perch
Aphredoderus sayanus

Redear sunfish
Lepomis microlophus

Shortnose gar
Lepisosteus platostomus

Spotted sucker
Minytrema melanops

Spotted sunfish
Lepomis punctatus

Tadpole madtom
Noturus gyrinus

Threadfin shad
Dorosoma petenense

Warmouth
Lepomis gulosus

White crappie
Pomoxis annularis

Yellow bullhead
Ictalurus natalis

PLANTS

Aquatics, Grasses, and Forbs

Bermudagrass
Cynodon dactylon

Bluestems
Andropogon spp.

Carpetgrass
Axonopus affinis

Chufa
Cyperus esculentus

Clover
Trifolium spp.

Cocklebur
Xanthium stumarium

Coontail
Ceratophyllum demersum

Cyperus (redroot)
Cyperus erythrorhizos

Dallisgrass
Paspalum dilatatum

Eastern gamagrass
Tripsacum dactyloides

Fall panicum
Panicum dichotomiflorum

Fescue
Festuca arundinacea

Giant cutgrass
Zizaniopsis miliacea

Goat weed
Croton capitatus

Indiangrass
Sorghastrum nutans

Lespedeza
Lespedeza spp.

Lotus
Nelumbo lutea

Najas
Najac spp.

Paille fine
Panicum hemitomon

Palmetto
Sabal minor

Pondweed
Potamogeton spp.

Ryegrass
Lolium multiflorum

Sedges
Carex spp.

Smartweed
Polygonum spp.

Spatterdock
Nuphar luteum

Stoneworts
Chara spp.

Switchgrass
Panicum virgatum

Vaseygrass
Paspalum urvillei

Water-hyacinth
Eichhornia crassipes

Waterlily
Nyphaea spp.

Watermifoil
Myriophyllum spp.

Wheat
Triticum aestivum

Wild millet
Echinochloa crusgalli

Shrubs and Vines

Alabama supplejack
Berchemia scandens

American elder
Sambucus canadensis

Blackberry
Rubus spp.

Dewberry
Rubus spp.

Greenbrier
Smilax spp.

Hawthorn
Crategus marshalli

Honeysuckle
Lonicera japonica

Possumhaw
Ilex decidua

Privet
Ligustrum vulgare

Spanish moss
Tillandsia unseoides

Swampprivet
Forestiera acuminata

Trumpetcreeper
Campsis radicans

Trees

American elm
Ulmus americana

Bald cypress
Taxodium distichum

Blackgum
Nyssa sylvatica

Black willow
Salix nigra

Bitter pecan
Carya aquatica

Green ash
Fraxinus pennsylvanica

Hickory
Carya spp.

Loblolly pine
Pinus taeda

Overcup oak
Quercus lyrata

Pecan
Carya illinoensis

Sugarberry (Hackberry)
Celtis laevigata

Swamp chestnut oak
Quercus michauxii

Swamp dogwood
Cornus drummondii

Sweetgum
Liquidambar styraciflua

Water tupelo
Nyssa aquatica

Water oak
Quercus nigra

Willow oak
Quercus phellos

Cultivated Crops

Corn
Zea mays

Cotton
Gossypium hirsutum

Rice
Oryza sativa

Soybeans
Glycine max

Sweet potatoes
Ipomoea batatas

EXAMPLE

APPENDIX I

OPERATION AND MAINTENANCE AGREEMENT

FOR

STRUCTURAL MEASURES

____ PROJECT

THIS AGREEMENT made and entered into the________day of___________,19_____ is between the Soil Conservation Service, United States Department of Agriculture, hereinafter referred to as the "Service," and the following organization(s), hereinafter referred to as the Sponsor(s):

Show name(s) of Sponsoring Local Organization(s) responsible for operation and maintenance

The measures covered by this Operation and Maintenance Agreement are identified as:

Individually name and identify the works of improvement listed in the Work Plan.

As an example:

All multiple purpose channels listed in the Watershed Work Plan.

A. OPERATIONS

1. The Sponsor will be responsible for and will operate or have operated without cost to the Service the structural measures in compliance with any applicable Federal, State, and local laws, and in a manner that will assure that the structural measures will serve the purpose for which installed as set forth in the Work Plan.

2. The Service will, upon request of the Sponsor and to the extent that its resources permit, provide consultative assistance in the operation of the structural measures.

B. MAINTENANCE

1. The Sponsor will:

   a. Be responsible for and promptly perform or have preformed without cost to the Service except as provided in Paragraph C, Establishment Period, all maintenance of the structural measures determined by either the Sponsor or the Service to be needed.

   b. Obtain prior Service approval of all plans, designs, and specifications for maintenance work involving major repair.

2. The Service will, upon request of the Sponsor and to the extent that its resources will permit, provide consultive assistance in the preparation of plans, designs, and specifications for needed repair of the structural measures.

C. ESTABLISHMENT PERIOD

1. During an Establishment Period, as herein defined, the Service will bear such part of the cost of any needed major repairs to the structural measures, including associated vegetative work, as is proportionate to the original construction costs borne by the Service in the construction of the structural measures except that the Service will not bear any of the cost for:

   a. Repairs to channels or portions thereof which do not have permanent linings such as concrete, riprap, or grouted rock.

   b. Repairs determined by the Service to have been occasioned by improper operation or maintenance, or both.

   c. Repairs that are mutually determined by the Sponsor and the Service as being items of normal maintenance rather than major repair and are not therefore in keeping with the spirit and intent of the Establishment Period provisions.

2. The Establishment Period for structural measures (exclusive of any associated vegetative work) is a period of 3 years ending at midnight on the third anniversary of the data on which the structural measure is accepted.

3. The Establishment Period for vegetative work associated with a structural measure is a period from date of acceptance of the initial vegetative work to midnight of the date on which the Service writes the Sponsor advising that an adequate vegetative cover has been obtained. However, this period shall not exceed two growing seasons or the end of the Establishment Period for the associated structural measure whichever is greater in time.

4. As used in the two preceding paragraphs, and elsewhere in this Agreement, the following words have the meanings described below:

   ACCEPTED, ACCEPTANCE: The date structural or vegetative measures are accepted from the contractor when a contract is involved, or the date structural or vegetative measures are completed to the satisfaction of the Service when force account operations are involved.

   ADEQUATE VEGETATIVE COVER: A minimum of seventy percent (70%) evenly distributed cover of the desirable species, with no active rilling that cannot be controlled by the vegetation.

5. Major repair may involve such things as (1) replacing significant backfill around structures resulting from major erosion damage, (2) revegetating where adequate cover was not obtained, (3) restoring areas with significant erosion, and (4) removing trash and debris from bridges, culverts, and fence crossings.

6. No action with respect to needed repairs during the Establishment Period will be taken by the Sponsor or the Service which would lessen or adversely affect any legal liability of any contractor or his surety for payment of the cost of the repairs.

D. INSPECTIONS AND REPORTS

1. During the Establishment Period the Sponsor and the Service will jointly inspect the structural measures at least annually and after unusually severe floods or the occurrency of any other unusual condition that might adversely affect the structural measures. It is desirable the annual inspections be performed during the month shown below. Any supplemental inspections then determined necessary will be scheduled and agreed to at that time.

____
(Month)

2. After the Establishment Period, the structural measures will be inspected annually by the Sponsor, preferably during the month shown below, and after unusually severe floods or the occurrence of any other unusual condition that might adversely affect the structural measures.

____
(Month)

3. After the Establishment Period, the Service may inspect the structural measures at any reasonable time.

4. A written report will be made of each inspection. The report of joint inspections will be prepared by the Sponsor with the assistance of the Service. A copy of each report will be provided by party preparing the report to the other party within 10 days of the date on which the inspection was made.

E. RECORDS

The Sponsor will maintain in a centralized location a record of all inspections performed both individually and jointly by the Sponsor and the Service, and of all significant actions taken by the Sponsor with respect to operation and maintenance. The Service may inspect these records at any reasonable time.

F. GENERAL

1. The Sponsor will:

   a. Prohibit the installation of any structures or facilities that will interfere with the operation or maintenance of the structural measures.

   b. Obtain prior Service approval of the plans and specifications for any alteration or improvement to the structural measures.

c. Obtain prior Service approval of any agreement to be entered into with other parties for the operation or maintenance of all or any part of the structural measures, and provide the Service with a copy of the agreement after it has been signed by the Sponsor and the other party.

2. Service personnel will be provided the right of free access to the structural measures at any reasonable time for the purpose of carrying out the terms of this agreement.

3. The responsibilities of the Sponsor under this agreement are effective simultaneously with the acceptance of the works of improvement in whole or in part.

G. SPECIAL PROVISIONS

An Operation and Maintenance (O&M) Plan will be prepared for each structure or channel (or similar groups of structures or channels) listed on page one of this agreement at the time of advertisement for bids for such structures or channels. Such O&M plans will be made a part of this agreement.

H. AUTHORIZATION

Name of Sponsor ____

By ____________________________ Title ______________________________

This action was authorized at an official meeting of the Sponsor named immediately above on ___________ at ____________________________

Attest _________________________________ Title ___________________________

Name of Sponsor ____

By ____________________________ Title ______________________________

This action was authorized at an official meeting of the Sponsor named immediately above on ___________ at ____________________________

Attest _________________________________ Title ___________________________

Soil Conservation Service, United States Department of Agriculture

By ____________________________ Title ______________________________

OPERATION AND MAINTENANCE PLAN
(CHANNELS)

These channels have been designed and constructed to provide flood protection and drainage for the surrounding lands. This will be accomplished if the channel dimensions are not reduced and the flow of water is not obstructed by trees, brush, weeds, cross fences, and heavy trash. For example, a moderately heavy growth of 2-year old willows in the channel could cut the planned capacity by 50 percent or more. The same is true for equivalent growths of cotton-woods, alders, and water-loving plants such as cattails.

Another important feature of the channel job is the service road along the banks. It is essential that this road be passable with maintenance equipment at all times.

Many of the things required to keep the channel in good working condition could be called routine maintenance which is really nothing more than "normal good care." This includes:

1. Control of brush and weeds. Removal of willows, cottonwoods, alders, the larger woody-stemmed weeds and water plants is a yearly job. They may need attention twice a year in those years when conditions are unusually favorable for rapid regrowth. The job of control more than doubles with the age of the plants. As an example, the difficulty and cost of killing 2-year old willows can be about four times as difficult and costly as killing them in the early seedling stage. In addition, the 2-year old and older willows tend to block the channel even after they are killed.

   Spraying, chopping, or mowing are all effective ways of getting rid of brush and weeds. Remember, the service road and the berms need attention the same as the channel.

   The kinds of brush that are likely to give the most trouble are blackwillow, buttonbush, cottonwood, and sycamore.

   The best time to spray is about the time the brush becomes full-leaved.

   CAUTION: If herbicides are handled or applied improperly or if unused portions are not disposed of safely, they may be injurous to humans, domestic animals, desirable plants, fish or wildlife and they may contaminate water supplies. Drift from aerial spraying can contaminate nearby crops and other vegetation. <u>Follow the directions and heed all precautions on the container label</u>.

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

2. Keep fences and water gaps in good condition. Look them over after each bank-full flow. Replace missing staples and posts; replace broken wire.

3. Maintain side inlet structures and bridges. Replace any soil that washes from around the metal pipes under the service road.

4. Remove sediment deposits as soon as possible after they are formed. If allowed to remain they not only reduce the size of the channel, they provide good sites for willows and other brush to get a foothold. They may also divert the flow and cause erosion of the channel banks.

APPENDIX J

Letters of Comments Received on the Draft Environmental Statement

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VI
1600 PATTERSON
DALLAS, TEXAS 75201

February 5, 1975

Mr. Alton Mangum
State Conservationist
Soil Conservation Service
P. O. Box 1630
Alexandria, Louisiana 71301

Dear Mr. Mangum:

We have reviewed the Draft Environmental Impact Statement and Watershed Work Plan, Bayou Plaquemine Brule Watershed, Acadia and St. Landry Parishes. The proposed project provides for urban and watershed protection, flood prevention, and improved drainage through various land treatment practices and structural measures. Structural measures will include the enlargement of 229 miles of channel (227 miles previously manmade or modified), channel clearing, water control structures (weirs and pipedrops) and grade stabilization structures.

Generally, the draft statement is very complete and addresses many of the project-associated impacts. However, we suggest that the following comments be considered in the final statement and work plan:

1. We suggest that the statement include a more complete discussion of the impacts associated with the alteration, modification or reconstruction of existing facilities (e.g., bridges) that will be affected by project implementation. The location of major facility changes should be provided. This information would be helpful in evaluating the total impact of the project.

2. According to the draft statement and work plan, construction on tributary channels to Bayou Plaquemine Brule and Bayou Wikoff will be terminated at a distance that will reduce adverse impacts on fisheries in the two waterways. However, it appears from the project map provided that many of the side channels are excavated to their confluence with the main channels. This inconsistency should be discussed. Also, the approximate distance at which construction will be halted should be given where possible.

These comments classify your Draft Environmental Impact Statement as LO-1. Specifically, we have no objections to the proposed plan at this time. We believe your agency has presented an adequate discussion of the impacts of the proposed project and the alternatives available. The classification and the date of our comments will be published in the Federal Register in accordance with our responsibility to inform the public of our views on proposed Federal actions, under Section 309 of the Clean Air Act.

Definitions of the categories are provided on the attachment. Our procedure is to categorize our comments on both the environmental consequences of the proposed action and on the adequacy of the impact statement at the draft stage, whenever possible.

We appreciate the opportunity to review the Draft Environmental Impact Statement. Please send us two copies of the Final Environmental Impact Statement at the same time it is sent to the Council on Environmental Quality.

Sincerely yours,

Regional Administrator

Enclosure

ENVIRONMENTAL IMPACT OF THE ACTION

LO - Lack of Objections

EPA has no objections to the proposed action as described in the draft impact statement; or suggests only minor changes in the proposed action.

ER - Environmental Reservations

EPA has reservations concerning the environmental effects of certain aspects of the proposed action. EPA believes that further study of suggested alternatives or modifications is required and has asked the originating Federal agency to re-assess these aspects.

EU - Environmentally Unsatisfactory

EPA believes that the proposed action is unsatisfactory because of its potentially harmful effect on the environment. Furthermore, the Agency believes that the potential safeguards which might be utilized may not adequately protect the environment from hazards arising from this action. The Agency recommends that alternatives to the action be analyzed further (including the possibility of no action at all).

ADEQUACY OF THE IMPACT STATEMENT

Category 1 - Adequate

The draft impact statement adequately sets forth the environmental impact of the proposed project or action as well as alternatives reasonably available to the project or action.

Category 2 - Insufficient Information

EPA believes the draft impact statement does not contain sufficient information to assess fully the environmental impact of the proposed project or action. However, from the information submitted, the Agency is able to make a preliminary determination of the impact on the environment. EPA has requested that the originator provide the information that was not included in the draft statement.

Category 3 - Inadequate

EPA believes that the draft impact statement does not adequately assess the environmental impact of the proposed project or action, or that the statement inadequately analyzes reasonably available alternatives. The Agency has requested more information and analysis concerning the potential environmental hazards and has asked that substantial revision be made to the impact statement. If a draft statement is assigned a Category 3, no rating will be made of the project or action, since a basis does not generally exist on which to make such a determination.

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

OFFICE OF THE SECRETARY

WASHINGTON, D.C. 20201

January 15, 1975

Mr. Alton Magnum
State Conservationist
United States Department of Agriculture
Soil Conservation Service
Post Office Box 1630
Alexandria, Louisiana 71301

RE: Bayou Plaquemine Brule
Watershed, Louisiana

Dear Mr. Magnum:

This will acknowledge receipt of your letter dated transmitting the above-mentioned draft Environmental Impact Statement.

We have forwarded this statement to Jerry Stephens, the Regional Environmental Officer in this area, and he will respond directly to you. If you have any questions concerning this statement, please address them to:

Mr. Jerry Stephens
1114 Commerce Street, Room 925
Dallas Texas 75202

We appreciate the opportunity to comment on this statement.

Sincerely,

Charles Custard

Charles Custard
Director,
Office of Environmental Affairs

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
REGIONAL OFFICE
1114 COMMERCE STREET
DALLAS, TEXAS 75202

OFFICE OF
THE REGIONAL DIRECTOR

Our Reference: EI# 1274-482

February 21, 1975

Mr. Alton Mangum
DOA
Soil Conservation Service
P.O. Box 1630
Alexandria, Louisiana 71301

RE: Bayou Plaquemine Brule Watershed

Mr. Mangum:

Pursuant to your request, we have reviewed the Environmental Impact Statement for the above project proposal in accordance with Section 102(2) (c) of P. L. 91-190, and the Council on Environmental Quality Guidelines of April 23, 1971.

Environmental health program responsibilities and standards of the Department of Health, Education, and Welfare include those vested with the United States Public Health Service and the Facilities Engineering and Construction Agency. The U.S. Public Health Service has those programs of the Federal Food and Drug Administration, which include the National Institute of Occupational Safety and Health and the Bureau of Community Environmental Management (housing, injury control, recreational health and insect and rodent control).

Accordingly, our review of the Draft Environmental Statement for the project discerns no adverse effects that might be of significance where our program responsibilities and standards pertain, provided that appropriate guides are followed in concert with State, County, and local environmental laws and regulations.

We therefore have no objection to the authorization of this project insofar as our interests and responsibilities are concerned.

Very truly yours,

Wm F. Crawford

William F. Crawford
Environmental Impact Coordinator

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
REGION SIX
750 Florida Boulevard
Baton Rouge, Louisiana 70801

January 9, 1975

IN REP

Draft Environmental Impact Statement
Bayou Plaquemine Brule Watershed
Acadia and St. Landry Parishes

Mr. Alton Mangum, State Conservationist
Soil Conservation Service
P. O. Box 1630
Alexandria, Louisiana 71301

Dear Mr. Mangum:

Your December 23, 1974 letter, transmitted to us two copies of the draft environmental statement for the captioned project. We have reviewed the statement and have nothing to add to the comments contained in our preliminary draft review letter dated November 7, 1974.

We are pleased that one of the benefits from the project will be reduced flood damages to roads and bridges in the area.

Sincerely yours,

Mitchell D. Smith

for M. C. Reinhardt
Division Engineer

United States Department of the Interior

GEOLOGICAL SURVEY
Water Resources Division
P.O. Box 66492
Baton Rouge, Louisiana 70806

January 30, ~~1975~~

Mr. Alton Mangum
State Conservationist
Soil Conservation Service
P.O. Box 1630
Alexandria, Louisiana 71301

Dear Mr. Mangum:

We replied on January 16, 1975, to the request for review of the Bayou Plaquemine Brule Watershed EIS originated by our headquarters office. A copy of that reply is attached.

Sincerely yours,

FOR THE DISTRICT CHIEF

Max J. Forbes, Jr.

Max J. Forbes, Jr.
Hydrologist

Enclosure

OPTIONAL FORM NO. 10
MAY 1962 EDITION
GSA FPMR (41 CFR) 101-11.6

UNITED STATES GOVERNMENT

Memorandum

O : George H. Davis, WRD
Attention: G. H. Chase
Reston, Virginia Mail Stop 407

DATE: January 16, 1975

ROM : District Chief, WRD
Baton Rouge, Louisiana

UBJECT: Review of draft environmental statement and work plan for Bayou Plaquemine Brule Watershed, St. Landry and Acadia Parishes, Louisiana (ER-74/1586)

We have reviewed the subject statement and find it to be reasonably adequate and accurate in its evaluation of the impact of the proposed action on the hydrologic environment.

FOR THE DISTRICT CHIEF

Max J. Forbes, Jr.
Hydrologist

cc:
Regional Hydrologist, CR, WRD
Lakewood, Colorado
District reading file

MJForbes:as 1-16-75

5010-108

Buy U.S. Savings Bonds Regularly on the Payroll Savings Plan

Advisory Council
On Historic Preservation
1522 K Street N.W. Suite 430
Washington D.C. 20005

Mr. Alton Mangum
State Conservationist
Soil Conservation Service
U. S. Department of Agriculture
P. O. Box 1630
Alexandria, Louisiana 71301

JAN 2 6 1975

Dear Mr. Mangum:

This is in response to your request of December 23, 1974 for comments on the draft environmental statement (DES) and watershed work plan (WWP) for the Bayou Plaquemine Brule Watershed, Louisiana. Pursuant to its responsibilities under Section 102(2)(C) of the National Environmental Policy Act of 1969, the Advisory Council has determined that your DES and WWP appear adequate concerning compliance with Section 106 of the National Historic Preservation Act of 1966 and the provisions of Executive Order 11593, "Protection and Enhancement of the Cultural Environment," issued May 13, 1971. However, the Council noted that the Soil Conservation Service (SCS) has contracted for a cultural survey of the area to be impacted by this undertaking and that the results of this survey will appear in the final environmental statement and work plan.

The Council wishes to remind SCS that should this survey identify cultural properties which meet the criteria for inclusion in the National Register of Historic Places that will be affected by the project, it is required to afford the Council an opportunity to comment in accordance with the "Procedures for the Protection of Historic and Cultural Properties" (36 C.F.R. Part 800), (copy enclosed). Steps to determine eligibility and effect are detailed in Section 800.4 of the procedures.

Should you have any questions or require any additional assistance, please contact Michael H. Bureman of the Advisory Council staff at P. O. Box 25085, Denver, Colorado 80225, telephone number (303) 234-4946.

Sincerely yours,

John D. McDermott

John D. McDermott
Director, Office of Review
and Compliance

Enclosure

The Council is an independent unit of the Executive Branch of the Federal Government charged by the Act of October [illegible], 1966 to advise the President and Congress in the field of Historic Preservation.

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

MAILING ADDRESS:
U.S. COAST GUARD (G-WS/73)
400 SEVENTH STREET SW.
WASHINGTON, D.C. 20590
PHONE: (202) 426-2262

FEB 24 1975

Mr. Alton Mangum
State Conservationist
Soil Conservation Service
P. O. Box 1630
Alexandria, Louisiana 71301

Dear Mr. Mangum:

This is in response to your letter of 23 December 1974 addressed to Commandant, U. S. Coast Guard concerning a draft environmental impact statement for the Bayou Plaquemine Brule Watershed, Acadia and St. Landry Parishes, Louisiana.

The Department of Transportation has reviewed the material submitted. We have no comments to offer nor do we have any objection to this project.

The opportunity to review this draft statement is appreciated.

Sincerely,

R. I. PRICE
Rear Admiral, U. S. Coast Guard
Chief, Office of Marine Environment
and Systems

W

UNITED STATES DEPARTMENT OF COMMERCE
The Assistant Secretary for Science and Technology
Washington, D.C. 20230

February 25, 1975

Mangum
McGowen
Rucker
Hickman
Agnew
Stusher
Douglas
Warren
Greene
Tech. Spec.
Thompson
W/S & R/B

Mr. Alton Mangum
State Conservationist
United States Department of
Agriculture
Soil Conservation Service
P.O. Box 1630
Alexandria, Louisiana 71301

Dear Mr. Mangum:

The draft environmental impact statement for "Bayou Plaquemine Brule Watershed, Acadia and St. Landry Parishes, Louisiana," which accompanied your letter of December 23, 1974, has been received by the Department of Commerce for review and comment.

The statement has been reviewed and the following comments are offered for your consideration.

A number of geodetic control survey monuments are located in the water shed area described in the subject document. If there is any planned activity which will disturb or destroy these monuments, the National Ocean Survey (NOS) requires not less than 90 days notification in advance of such activity in order to plan for their relocation. NOS recommends that funding for the proposed construction include the cost of any relocation required for NOS monuments.

Thank you for giving us an opportunity to provide these comments, which we hope will be of assistance to you. We would appreciate receiving a copy of the final statement.

Sincerely,

Sidney R. Galler

Sidney R. Galler
Deputy Assistant Secretary
for Environmental Affairs

AMERICAN REVOLUTION BICENTENNIAL 1776-1976

STATE OF LOUISIANA

Department of Art, Historical and Cultural Preservation

OLD STATE CAPITOL, BATON ROUGE, LOUISIANA 70801

(504) 389-5086

January 9, 1975

Mr. Alton Mangum
State Conservationist
Soil Conservation Service
P. O. Box 1630
Alexandria, Louisiana 71301

USDA-SCS-ES-WS-(ADM)-75-3-(D)-LA
Bayou Plaquemine Brule Watershed
Acadia and St. Landry Parishes

Dear Mr. Mangum:

This Department does not know of any sites on the National Register of Historic Places or being actively nominated to the National Register of Historic Places which would be effected by the proposed project.

Thank you for the opportunity for comment on the project.

Sincerely,

Jay R. Broussard

Jay R. Broussard
State Historic Preservation Officer
Director, Department of Art, Historical and Cultural Preservation

JB/bc

LOUISIANA HEALTH AND HUMAN RESOURCES ADMINISTRATION

DIVISION OF HEALTH
P.O. BOX 60630
NEW ORLEANS, LOUISIANA 70160

EDWIN EDWARDS
GOVERNOR

January 3, 1975

Mr. Alton Mangum, State Conservationist
P. O. Box 1630
Alexandria, Louisiana 71301

Re: Review of vector control aspects of the Bayou Plaquemine Brule Watershed Project in Acadia and St. Landry Parish's

Dear Mr. Mangum:

The Watershed Wrok Plan and the Draft Environmental Statement concerning the above project have been reviewed by this office for probable effects upon insect vector control.

It is our conclusion that implementation of the project as planned should reduce the breeding habitats of mosquitoes of several species including both flood water and permanent water varieties.

Thank you for providing us the opportunity to review this proposed project.

Very truly yours,

G. Roy Hayes, Jr.

G. Roy Hayes, Jr., Chief
Section of Solid Waste and Vector Control

GRH/rmn

cc: Mr. John Koury, Regional Engineer
Mr. Paul Scheppf, Public Health Entomologist

Louisiana Forestry Commission

James E. Mixon, State Forester

~~Box 15293, Broadview Sta.~~ Box 1628 Baton Rouge, Louisiana ~~70815~~ 70821

COOPERATION - PL-566 - Bayou Plaquemine Brule Watershed

January 17, 1975

Mr. Alton Mangum
State Conservationist
Soil Conservation Service
P. O. Box 1630
Alexandria, Louisiana 71301

Dear Mr. Mangum:

This is to advise that we have no objection to the Environmental Impact Statement for the Bayou Plaquemine Brule Watershed.

B. F. GRIFFIN - ASSISTANT CHIEF, FOREST MANAGEMENT

DY

CC: Mr. Duane Routh

State of Louisiana

LEO W. HOUGH
STATE GEOLOGIST

LOUISIANA GEOLOGICAL SURVEY
BATON ROUGE 70803

January 16, 1975

Mr. Alton Mangum, State Conservationist
Soil Conservation Service
U. S. Department of Agriculture
P. O. Box 1630
Alexandria, Louisiana 71301

Re: Preliminary Draft
Bayou Plaquemine Brule Watershed

Dear Mr. Mangum:

We have reviewed the Preliminary Draft of the Bayou Plaquemine Brule Watershed Work Plan and Environmental Impact Statement.

It is our feeling that the multiple land use concepts provided in this plan are commendable. Further, the anticipated reduction in floodwater damage from \$983,700 per year to \$280,800 per year is worth the project cost alone.

The plan appears to be well conceived and should prove to be a valuable asset to the area involved over a period of time.

We appreciate your letting us review this plan.

Yours very truly,

LOUISIANA GEOLOGICAL SURVEY

Leo W. Hough, State Geologist

Harry L. Roland, Jr.

by: Harry L. Roland, Jr.
Assistant State Geologist

HLR:FMM

United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

In Reply Refer To:
ER-74/1586

Dear Mr. Mangum:

Thank you for your letter of December 23, 1974, requesting our views and comments on the draft environmental statement and work plan for the Bayou Plaquemine Brule Watershed, St. Landry and Acadia Parishes, Louisiana. We offer the following comments.

Both documents state that mineral resources in the watershed are limited to oil and gas and that a deep-seated salt dome probably exists at Crowley. Neither document mentions the presence of other mineral resources such as sand and gravel, clays, and sulfur, nor mentions the existence of pipelines in the area. Although we do not anticipate a significant conflict between the proposed works of improvement and mineral resource extraction and exploration activity, we believe that final copies of both documents should acknowledge the existence of pipelines in the area and discuss plans for relocating or protecting them, if necessary.

The proposed action will not adversely affect any existing or proposed unit of the National Park System, not any site eligible for registration as a National Historic, Natural or Environmental Education Landmark.

The draft environmental statement and work plan adequately describe the proposed project and its effects on fish and wildlife resources.

We trust the foregoing information will be of assistance to you.

Sincerely yours,

Stanley K Doremus

Secretary of the Interior

Mr. Alton Mangum
State Conservationist
Alexandria, Louisiana 71301

CONSERVE
AMERICA'S
ENERGY

Save Energy and You Serve America!

DEPARTMENT OF THE ARMY
OFFICE OF THE ASSISTANT SECRETARY
WASHINGTON, D.C. 20310

10 [illegible] 1975

Honorable Robert W. Long
Assistant Secretary of Agriculture
Washington, D. C. 20250

Dear Mr. Long:

In compliance with the provisions of Section 5 of Public Law 566, 83d Congress, the views of the Secretary of the Army were requested for the Watershed Work Plan and Draft Environmental Statement for Bayou Plaquemine Brule Watershed, St. Landry and Acadia Parishes, Louisiana.

We have reviewed the work plan and foresee no conflict with any projects or current proposals of this Department. Comments on the draft environment statement are inclosed.

Sincerely,

Charles R. Ford

Charles R. Ford
Deputy Assistant Secretary of the Army
(Civil Works)

1 Incl (dupl)
As stated

AMERICAN REVOLUTION BICENTENNIAL 1776-1976

COMMENTS ON
DRAFT ENVIRONMENTAL IMPACT STATEMENT
BAYOU PLAQUEMINE BRULE WATERSHED, LOUISIANA

The possibility of induced clearing of woodlands as a result of project implementation should be more fully discussed. The figures on land use changes with and without the project shown on page 21 of the EIS should be verified, especially in regard to forest land, since a stated objective is to increase level of protection from flooding and wetness.

The Type 15, Flood Insurance Study for Crowley, Louisiana, referenced on page 88 of the EIS, and a current study on Bayou Plaquemine Brule and tributaries being done by our New Orleans District disagree on the extent of flooding associated with the 100-year flood. Further, studies of discharge on Bayou Plaquemine Brule are in progress by the Corps in cooperation with the Alexandria, Louisiana, SCS office.

The lower 19 miles of Bayou Plaquemine Brule was included as a navigation channel improvement by the River and Harbor Act of 25 June 1910. Commerce averaging in access of 16,000 tons per year has been reported each year since 1966. Maintenance in the form of aquatic growth control has been performed in recent years, and the State of Louisiana has cleared, snagged, and straightened the channel for flood control. The EIS omits mention of any effects, beneficial or adverse, that the proposed project would have on navigability in this waterway. We suggest that the probable effects of shoaling during the construction period and possible increased need for aquatic growth control be discussed in the EIS.

APPENDIX K

CHANNEL WORK BY REACHES

Channel	Station	Inventory of Channel Work 1/		
		Type of Work	Type Chan. Before Proj.	Flow Cond. Before Proj.
M-1	2934+67	VI	M	E
	2504+00	VI	M	E
	2160+00	VI	M	I
	2015+00	II	M	I
	1285+00	VI	M	I
	0+00	VI	M	Pr
L-1A	255+00	IV	M	E
	150+00	IV	M	E
	0+00	VI	M	S
L-1A-1	135+00	II	M	E
	0+00	II	M	E
L-1A-1A	27+00	II	M	E
	0+00	II	M	E
L-1B	794+43	II	M	E
	590+00	II	M	E
	575+00	IV	M	E
	451+00	II	M	E
	300+00	II	M	S
	0+00	VI	M	S
L-1C	62+00	II	N	S
	0+00	II	N	S
L-1D	299+00	II	M	E
	88+00	II	M	E
	0+00	VI	M	S
L-1D-1	68+00	II	M	E
	0+00	II	M	E
L-1D-3	104+00	II	M	E
	0+00	II	M	E

1/ See Attached Coding System For Inventory Of Channel Work

APPENDIX K

CHANNEL WORK BY REACHES

Channel	Station	Inventory of Channel Work 1/ Type of Work	Type Chan. Before Proj.	Flow Cond. Before Proj.
L-1D-4	53+00	II	M	E
	0+00	II	M	E
L-1E	479+00	VI	M	E
	365+00	VI	M	E
	321+21	VI	M	S
	0+00	VI	M	I
L-1E-1	61+00	II	M	E
	0+00	II	M	E
L-1E-2	35+00	II	M	E
	0+00	II	M	E
L-1E-3	59+00	II	M	E
	0+00	II	M	E
L-1E-4	228+00	II	M	E
	204+00	II	M	E
	0+00	VI	M	E
L-1E-4A	104+00	II	M	E
	0+00	II	M	E
L-1E-4B	112+00	II	M	E
	0+00	II	M	E
L-1E-4B-1	96+00	II	M	E
	0+00	II	M	E
L-1E-5	26+00	II	M	E
	0+00	II	M	E

1/ See Attached Coding System For Inventory Of Channel Work

APPENDIX K

CHANNEL WORK BY REACHES

Channel	Station	Inventory of Channel Work 1/ Type of Work	Type Chan. Before Proj.	Flow Cond. Before Proj.
L-1E-6	70+00	II	M	E
	60+00	II	M	E
	20+00	IV	M	E
	0+00	VI	M	E
L-1F	239+00	II	M	E
	184+00	II	M	E
	85+00	VI	M	E
	0+00	II	M	S
L-1F-1	60+00	II	M	E
	0+00	II	M	E
L-1F-1A	16+00	II	M	E
	0+00	II	M	E
L-1F-2	27+00	II	M	E
	0+00	II	M	E
L-1G	150+00	II	M	E
	0+00	II	M	E
L-1H	198+00	II	M	E
	0+00	II	M	E
L-1H-1	47+00	II	M	E
	0+00	II	M	E
L-1I	1258+00	VI	M	E
	1148+00	VI	M	E
	0+00	VI	M	I
L-1I-1	129+00	II	M	E
	0+00	II	M	E
L-1I-2	64+00	II	M	E
	0+00	II	M	E

1/ See Attached Coding System For Inventory Of Channel Work

APPENDIX K

CHANNEL WORK BY REACHES

Channel	Station	Inventory of Channel Work 1/ Type of Work	Type Chan. Before Proj.	Flow Cond. Before Proj.
L-1I-3	70+00	II	M	E
	0+00	II	M	E
L-1I-4	76+00	II	M	E
	47+00	II	M	E
	0+00	II	N	E
L-1I-5	467+41	II	M	E
	430+00	II	M	E
	390+00	IV	M	E
	245+00	II	M	E
	0+00	VI	M	E
L-1I-6	402+57	II	M	E
	120+00	II	M	E
	0+00	VI	M	E
L-1I-7	369+23	II	M	E
	290+21	II	M	E
	236+50	IV	M	E
	150+00	II	M	E
	35+17	IV	M	E
	0-1+40	VI	M	E
L-1I-7A	76+06	II	M	E
	46+00	II	M	E
	0-0+24	VI	M	E
L-1I-8	115+25	II	M	E
	0+00	II	M	E
L-1I-8A	23+70	II	M	E
	0+00	II	M	E
L-1I-8A-1	49+76	II	M	E
	0+00	II	M	E

1/ See Attached Coding System For Inventory Of Channel Work

APPENDIX K

CHANNEL WORK BY REACHES

Channel	Station	Inventory 1/ of Channel Work: Type of Work	Type Chan. Before Proj.	Flow Cond. Before Proj.
L-1I-9	66+12	II	M	E
	0+00	II	M	E
L-1I-9A	65+00	II	M	E
	18+00	II	M	E
	0+00	IV	M	E
L-1I-9A-1	20+23	II	M	E
	0+00	II	M	E
L-1I-10	159+46	II	M	E
	130+00	II	M	E
	50+00	VI	M	E
	15+00	IV	M	E
	0+00	VI	M	E
L-1I-10A	15+00	II	M	E
	0+00	II	M	E
L-1I-10B	76+49	II	M	E
	54+00	II	M	E
	0+00	VI	M	E
L-1I-10B-1	48+57	II	M	E
	20+00	II	M	E
	0+00	VI	M	E
L-1I-11	82+82	II	M	E
	68+00	II	M	E
	0+00	VI	M	E
L-1I-12	44+68	IV	M	E
	9+00	IV	M	E
	0+00	VI	M	E
L-1J	86+00	II	M	E
	0+00	II	M	E

1/ See Attached Coding System For Inventory Of Channel Work

APPENDIX K

CHANNEL WORK BY REACHES

Channel	Station	Inventory of Channel Work 1/ Type of Work	Type Chan. Before Proj.	Flow Cond. Before Proj.
L-1J-1	33+00	II	M	E
	0+00	II	M	E
L-1K	449+80	II	M	E
	115+00	II	M	E
	50+00	IV	M	E
	0+00	II	M	E
Equation:	0+00 L.A. = 456+36 L.B.			
	456+36	IV	M	E
	357+50	IV	M	E
	0+00	VI	M	I
L-1K-1	105+00	II	M	E
	0+00	II	M	E
L-1K-1A	44+00	II	M	E
	0+00	II	M	E
L-1K-2	42+00	II	M	E
	0+00	II	M	E
L-1K-3	33+00	II	M	E
	0+00	II	M	E
L-1K-4	449+40	II	M	E
	220+00	II	M	E
	35+00	IV	M	E
	0+00	II	M	E
L-1K-4A	39+00	II	M	E
	0+00	II	M	E
L-1K-4B	158+98	II	M	E
	80+00	II	M	E
	0+00	VI	M	E
L-1K-4B-1	30+00	II	M	E
	0+00	II	M	E

1/ See Attached Coding System For Inventory Of Channel Work

APPENDIX K

CHANNEL WORK BY REACHES

Channel	Station	Inventory of Channel Work 1/ Type of Work	Type Chan. Before Proj.	Flow Cond. Before Proj.
L-1K-4B-2	52+00	II	M	E
	0+00	II	M	E
L-1K-4B-3	44+60	II	M	E
	0+00	II	M	E
L-1K-4C	49+00	II	M	E
	0+00	II	M	E
L-1K-4D	37+76	II	M	E
	0+00	II	M	E
L-1K-4E	54+42	II	M	E
	35+00	II	M	E
	0+00	VI	M	E
L-1K-5	238+37	II	M	E
	205+00	II	M	E
	150+00	IV	M	E
	115+00	II	M	E
	75+00	IV	M	E
	0+00	VI	M	E
L-1K-5A	92+00	II	M	E
	0+00	II	M	E
L-1K-5B	49+00	II	M	E
	0+00	II	M	E
L-1K-5B-1	23+00	II	M	E
	0+00	II	M	E
L-1K-6	78+00	II	M	E
	0+00	II	M	E
L-1K-7	86+00	II	M	E
	0+00	II	M	E

1/ See Attached Coding System For Inventory Of Channel Work

APPENDIX K

CHANNEL WORK BY REACHES

Channel	Station	Inventory of Channel Work 1/ Type of Work	Type Chan. Before Proj.	Flow Cond. Before Proj.
L-1L	364+47	II	M	E
	264+00	II	M	E
	160+00	VI	M	E
	120+00	IV	M	E
	74+00	II	M	E
	0+00	II	M	I
L-1L-1	381+00	II	M	E
	230+00	II	M	E
	185+00	IV	M	E
	115+00	VI	M	E
	50+00	IV	M	E
	15+00	II	M	E
	0+00	VI	M	E
L-1L-2	395+00	IV	M	E
	385+00	IV	M	E
	0+00	II	M	E
L-1L-2A	31+00	II	M	E
	0+00	II	M	E
L-1L-2B	29+00	II	M	E
	0+00	II	M	E
L-1L-2C	36+00	II	M	E
	0+00	II	M	E
L-1L-2D	52+00	II	M	E
	0+00	II	M	E
L-1L-2E	61+00	II	M	E
	0+00	II	M	E
L-1M	44+00	II	M	E
	0+00	II	M	E

1/ See Attached Coding System For Inventory Of Channel Work

APPENDIX K

CHANNEL WORK BY REACHES

Channel	Station	Inventory of Channel Work 1/ Type of Work	Type Chan. Before Proj.	Flow Cond. Before Proj.
L-1N	91+00	II	M	E
	0+00	II	M	E
L-1Ø	73+00	II	M	E
	0+00	II	M	E
L-1P	93+00	II	M	E
	80+00	II	M	E
	0+00	VI	M	E
L-1P-1	20+41	II	M	E
	11+54	II	M	E
	0+00	VI	M	E
L-1R	787+40	II	M	E
	515+00	II	M	E
Equation: 515+00 L.A. = 338+70 L.B.				
	338+70	II	M	E
	185+00	II	M	E
	50+00	II	M	E
	0+00	VI	M	E
L-1R-1	117+40	II	M	E
	15+00	II	M	E
	0+00	VI	M	E
L-1R-2	148+45	II	M	E
	105+00	II	M	E
	70+00	IV	M	E
	0+00	VI	M	E
L-1R-3	143+80	II	M	E
	0+00	II	M	E
L-1R-4	26+66	II	M	E
	0+00	II	M	E
L-1R-5	449+80	II	M	E
	515+00	II	M	E

1/ See Attached Coding System For Inventory Of Channel Work

APPENDIX K

CHANNEL WORK BY REACHES

Channel	Station	Inventory of Channel Work 1/ Type of Work	Type Chan. Before Proj.	Flow Cond. Before Proj.
L-1S	44+50	II	M	E
	24+00	II	M	E
	0+00	VI	M	E
L-1U	86+32	II	M	E
	50+00	II	M	E
	0+00	VI	M	E
L-1V	47+50	II	M	E
	20+00	II	M	E
	0+00	VI	M	E
L-1W	263+59	IV	M	E
	230+00	IV	M	E
	110+30	VI	M	E
	100+00	IV	M	E
	65+00	II	M	E
	20+00	IV	M	I
	0+00	VI	M	I
L-1W-1	164+50	II	M	E
	125+00	II	M	E
	52+00	VI	M	E
	0+00	IV	M	E
L-1W-1B	76+50	II	M	E
	0+00	II	M	E
L-1W-2	161+69	II	M	E
	140+00	II	M	E
	0+00	IV	M	E
L-1W-2A	131+65	II	M	E
	10+00	II	M	E
	0+00	IV	M	E

1/ See Attached Coding System For Inventory Of Channel Work

APPENDIX K

CHANNEL WORK BY REACHES

Channel	Station	Inventory of Channel Work 1/ Type of Work	Type Chan. Before Proj.	Flow Cond. Before Proj.
L-1W-2A-1	15+00	II	M	E
	0+00	II	M	E
L-1W-2B	52+54	II	M	E
	0+00	II	M	E
L-1W-5	46+86	II	M	E
	13+35	II	M	E
	0+00	VI	M	E
L-1W-5A	13+30	II	M	E
	0+00	II	M	E
L-1Y	104+80	II	M	E
	41+64	II	M	E
	0+00	VI	M	E
L-1Y-1	145+00	II	M	E
	40+00	II	M	E
	0+00	VI	M	E
L-1Z	94+00	II	M	E
	0+00	II	M	E
L-1Z-1	31+00	II	M	E
	0+00	II	M	E
L-1Z-2	33+00	II	M	E
	0+00	II	M	E
L-1Z-3	23+00	II	M	E
	0+00	II	M	E
L-1Z-5	18+00	II	M	E
	0+00	II	M	E
L-1Z-6	18+00	II	M	E
	0+00	II	M	E

1/ See Attached Coding System For Inventory Of Channel Work

APPENDIX K

CHANNEL WORK BY REACHES

Channel	Station	Inventory of Channel Work [1/] Type of Work	Type Chan. Before Proj.	Flow Cond. Before Proj.
L-1AA	171+20	VI	M	E
	0+00	VI	M	E
L-1AA-1	26+00	II	M	E
	0+00	II	M	E
L-1AA-2	21+00	II	M	E
	0+00	II	M	E
L-1AA-3	27+00	II	M	E
	0+00	II	M	E
L-1AA-4	9+00	II	M	E
	0+00	II	M	E
L-1AA-5	39+00	II	M	E
	0+00	II	M	E
L-1AA-5A	18+00	II	M	E
	0+00	II	M	E
L-1AA-6	26+00	II	M	E
	0+00	II	M	E
L-1AA-7	47+00	II	M	E
	0+00	II	M	E
L-1AA-8	38+00	II	M	E
	0+00	II	M	E
L-1BB	55+00	VI	M	E
	0+00	VI	M	E
L-1BB-1	242+00	II	M	E
	0+00	II	M	E
L-1BB-1A	31+00	II	M	E
	0+00	II	M	E

1/ See Attached Coding System For Inventory Of Channel Work

APPENDIX K

CHANNEL WORK BY REACHES

Channel	Station	Inventory of Channel Work 1/ Type of Work	Type Chan. Before Proj.	Flow Cond. Before Proj.
L-1BB-1A-1	16+00	II	M	E
	0+00	II	M	E
L-1CC	29+00	II	M	E
	0+00	II	M	E
L-1DD	122+00	II	M	E
	31+00	II	M	E
	0+00	VI	M	E
L-1DD-1	43+00	II	M	E
	0+00	II	M	E
L-1EE	27+00	II	M	E
	0+00	II	M	E
L-1FF	62+00	II	M	E
	0+00	II	M	E
L-1FF-1	25+00	II	M	E
	0+00	II	M	E
L-1FF-2	11+00	II	M	E
	0+00	II	M	E
L-1FF-3	8+00	II	M	E
	0+00	II	M	E
L-1GG	24+00	II	M	E
	0+00	II	M	E
L-1HH	193+00	II	M	E
	0+00	II	M	E
L-1HH-1	40+00	II	M	E
	0+00	II	M	E

1/ See Attached Coding System For Inventory Of Channel Work

APPENDIX K

CHANNEL WORK BY REACHES

Channel	Station	Inventory of Channel Work 1/		
		Type of Work	Type Chan. Before Proj.	Flow Cond. Before Proj.
L-1HH-2	18+00	II	M	E
	0+00	II	M	E
L-1II	77+00	II	M	E
	0+00	II	M	E
L-1II-1	33+00	II	M	E
	0+00	II	M	E
L-1JJ	86+00	II	M	E
	0+00	II	M	E
L-1JJ-1	24+00	II	M	E
	0+00	II	M	E
L-1KK	39+00	II	M	E
	0+00	II	M	E
L-1KK-1	13+00	II	M	E
	0+00	II	M	E
L-1KK-2	15+00	II	M	E
	0+00	II	M	E
L-1LL	20+00	II	M	E
	0+00	II	M	E
L-1MM	19+00	II	M	E
	0+00	II	M	E
L-1NN	250+00	II	M	E
	230+00	II	M	E
	0+00	VI	M	E
L-1ØØ	140+00	II	M	E
	0+00	II	M	E

1/ See Attached Coding System For Inventory Of Channel Work

APPENDIX K

CHANNEL WORK BY REACHES

Channel	Station	Inventory of Channel Work 1/		
		Type of Work	Type Chan. Before Proj.	Flow Cond. Before Proj.
L-1ØØ-1	25+00	II	M	E
	0+00	II	M	E
L-1ØØ-2	18+00	II	M	E
	0+00	II	M	E
L-1PP	116+00	II	M	E
	0+00	II	M	E
L-1QQ	46+00	II	M	E
	0+00	II	M	E
L-1RR	19+00	II	M	E
	0+00	II	M	E
L-1TT	104+00	II	M	E
	0+00	II	M	E

1/ See Attached Coding System For Inventory Of Channel Work

PLANNED PROJECT

Soil Conservation Service

Coding System for
Inventory of Channel Work

Type of Work	I -	establishment of new channel including necessary stabilization measures
	II -	enlargement or realignment of existing channel or stream
	III -	cleaning out natural or manmade channel (includes bar removal and major clearing and snagging operation)
	IV -	clearing and removal of loose debris within channel section
	V -	stabilization, by continuous treatment or treatment of localized problem areas, as primary purpose (present capacity adequate)
	VI -	adequate
Type of Channel Prior to Project	N -	an unmodified, well-defined natural channel or stream
	M -	manmade ditch or previously modified channel
	O -	none or practically no defined channel
Flow Condition Prior to Project	Pr -	perennial - flows at all times except during extreme drought
	I -	intermittent - continuous flow through some seasons of the year but little or no flow through other seasons
	E -	ephemeral - flows only during periods of surface runoff
	S -	ponded water with no noticeable flow, caused by lack of outlet or high ground water level.